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Archeological Investigations at the Pace McDonald Site (41AN51): A Middle Caddo Mound Center in the Neches River Basin in East Texas

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Table of Contents

List of Figures

List of Tables

Introduction

The Pace McDonald site (41AN51) is a previously poorly known prehistoric Caddo mound center on Mound Prairie Creek in Anderson County, Texas, in the upper Neches River Basin (Pearce and Jackson 1933; Newell and Krieger 1949; Story 2000; Thurmond 1978) (Figure 1). With the permission of one of the landowners, Mr. Johnny R. Sanford, Jr. the Friends of Northeast Texas Archaeology initiated an archaeological research effort at the site in 2010. The work began by a simple knock on the door

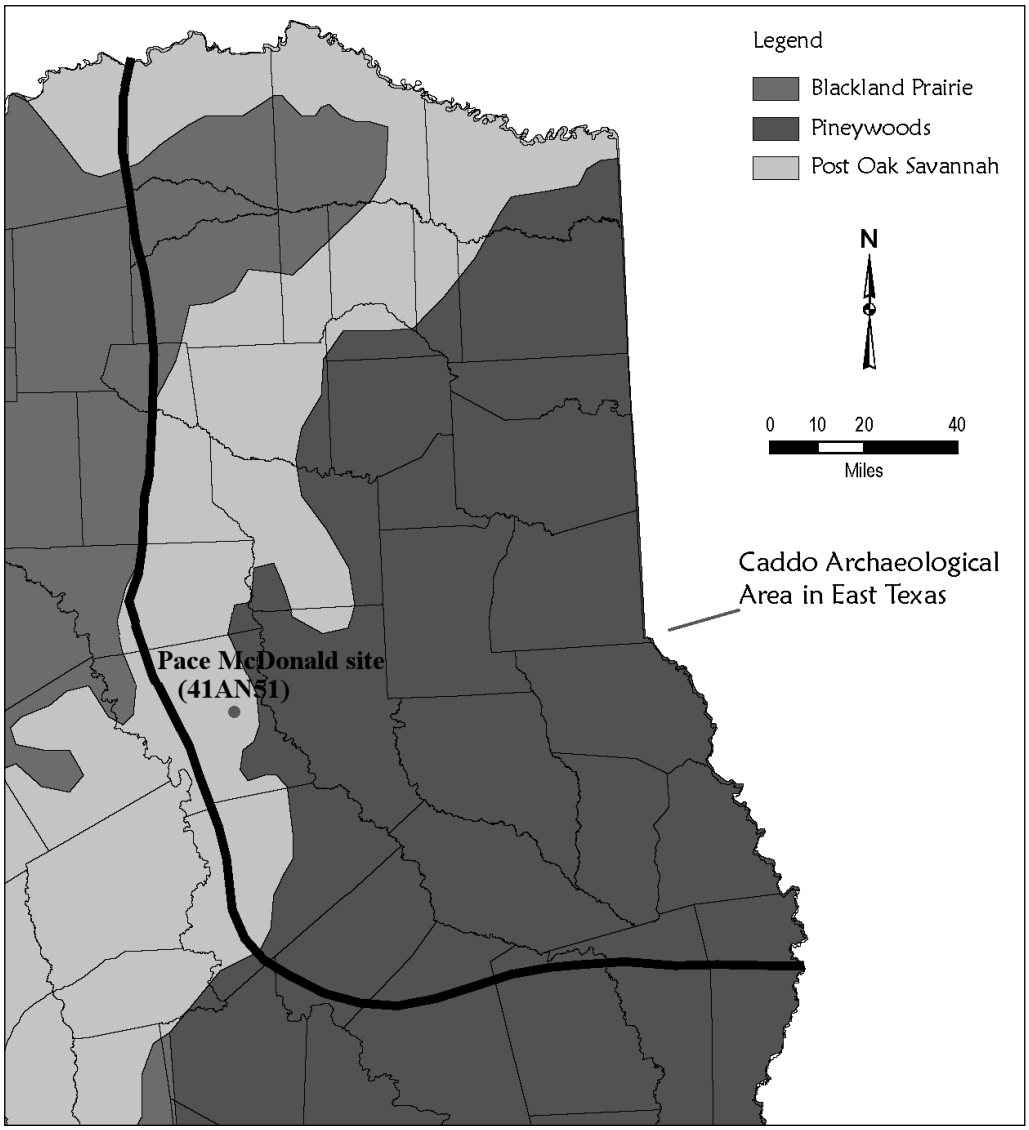


Figure 1. Location of the Pace McDonald site in East Texas.

of Johnny R. Sanford, Jr. one of the landowners at the site. Mr. Sanford and his gracious wife, Kimberly L., are aware of, and take great pride, in the fact that the Caddo Indians had once lived and built the mounds on his and adjoining properties. Mr. Sanford also has made it a point to protect the site from vandals. Mike Adkin and his wife Laura, another landowner, also granted us permission to conduct surface collections on his property, which is just south of Mr. Sanford's. The ultimate purpose of this work is to learn more about the native history of this mound center—when it was occupied and used, and by which prehistoric Caddo group—as well as its intra-site spatial organization, and ultimately obtain site-specific archaeological information that can help understand the site's place and role in the Caddo prehistory of this part of East Texas.

It will be a long-term effort to accomplish these tasks. We intend to rely upon both archaeological (i.e., survey, surface collections, systematic shovel testing, and focused hand excavations) and archaeogeophysical disciplines (especially to complete a magnetometer survey of as much as the site as possible), as this has become an important aspect of Caddo archaeological investigations, see Lockhart (2007), Perttula (2010), Walker and Perttula (2008), Walker (2009), McKinnon (2009), and Walker and McKinnon (2011), to gather relevant archaeological information on the location and character of Caddo house features and outdoor activity areas, as well as the associated material culture remains and preserved plant and animal remains. This report is a summary of what we have learned to date about the Pace McDonald site.

ECOLOGICAL SETTING

Leslie L. Bush and Timothy K. Perttula

The Pace McDonald site falls within the boundaries of modern Anderson County, several miles north of the town of Palestine in East Texas. Mean annual precipitation in Anderson County during the period 1951-1980 was 41.7 inches (105.9 cm). Precipitation is distributed fairly evenly over the year, with a slight peak in late spring. The frost-free season in Anderson County today averages 264 days and runs from March 8 through November 27 (NFIC 1987:21-22).

The Pace McDonald site is situated on a large and relatively flat upland landform (420-430 feet amsl) immediately north of Mound Prairie Creek, in central Anderson County, Texas, near the western edge of the East Texas Pineywoods (Diggs et al. 2006). Mound Prairie Creek is a southward- and eastward-flowing tributary to the Neches River; the confluence of these two streams lies about 20 km to the east of the site. When the site was first visited and recorded in the 1930s, it was in a large cotton field (Pearce and Jackson 1933:2). In more recent years, it is in an improved pasture, and the site is apparently owned by several landowners, including the Texas Historical Commission (see below).

The site is on an expanse of Elrose fine sandy loam, 1-3 percent slopes (Coffee 1975:17 and Sheet 34). This is a relatively fertile upland soil that "formed under a pine-hardwood forest in stratified marine and alluvial sediment high in glauconitic sandstone" (Coffee 1975:17 and Table 2). A typical profile of the Elrose fine sandy loam is a 25 cm thick A-horizon that ranges from reddish-brown to yellowish-red fine sandy loam developed atop a thick (ca. 165 cm) Bt horizon composed of red, dark red, yellowish-red, or strong brown sandy clay loam and sandy loam. The underlying C horizon is a massive red loamy fine sand with an occasional fragment of glauconitic sandstone.

The site lies just outside the modern western edge of the Pineywoods ecological region, where it begins to grade into the Post Oak Savannah. Upland forests in this part of the Texas Pineywoods are typically shortleaf pine communities, where shortleaf pine (*Pinus echinata*) shares dominance with oaks (several species, of both red and white groups) and hickories (several species, but frequently *Carya texana*). Coves and small streams support mixed hardwood-loblolly pine communities while larger streams support loblolly pines (*Pinus taeda*) mixed with moderately flood-tolerant hardwoods such as white oak (*Quercus alba*), water oak (*Q. nigra*), sweet gum (*Liquidambar styraciflua*), beech (*Fagus grandifolia*), and magnolia (*Magnolia grandiflora*) (Diggs et al. 2006:89-90). In swamps and backwaters, bald cypress

(*Taxodium distichum*), water tupelo (*Nyssa aquatica*) and water elm (*Planera aquatica*) are important (Diggs et al. 2006:90). Cane brakes would also have been present in these wet areas (Gow 1905).

Many small prairies were present in the Pineywoods. The "Redlands" around Nacogdoches are often mentioned, but prairies were also found elsewhere (Diggs et al. 2006:82). Fray Francisco Hidalgo noted in 1710 that, "The whole country, as far as it has been examined, is wooded. It contains many small open spaces, and stretches of sand and marshes where the Indians live" (Hatcher 1927:55). The place name "Mound Prairie Creek" suggests an open area near the site in early historic times.

Many ecologists conceptualize the Post Oak Savannah as a transition zone between the Eastern Woodlands and the grasslands of the mid-continent (Diggs et al. 2006). Other authors point out that the Post Oak Savannah is floristically very similar to the Pineywoods, a perspective that may help make sense of the extension of Caddo groups outside the Pineywoods region in Texas (MacRoberts and MacRoberts 2004; MacRoberts et al. 2002).

The Post Oak Savannah is broadly characterized by sandy soils, grasslands, and widely spaced trees. The most common trees are post oak (*Quercus stellata*) and blackjack oak (*Q. marilandica*). Common grasses include the tall grass prairie trio of little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*) and switchgrass (*Panicum virgatum*) (Diggs et al. 2006:116). There is much local variation within the Post Oak Savannah, however. As in the Pineywoods, streams nearby slopes would have had considerable variation in plant species. In the wetter areas, water oak (*Q. nigra*) and post oak would dominate floodplain forests along with elms (*Ulmus* spp.) and green ash *(Fraxinus pennsylvanica*). Grape vines (*Vitis* spp.), poison ivy (*Toxicodendron radicans*), cane (*Arundinaria gigantea*), sedges (Cyperaceae), and wet land grasses such as wildrye (*Elymus* spp.) and wood oats (*Chasmanthium* spp.) would also have been common (Diggs et al. 2006:122-123).

Vegetation Reconstructions

The most notable changes on the Post Oak Savannah since pre-settlement times include an increase in woody vegetation and the loss of "bottom prairie" communities along major rivers (Diggs et al. 2006:115-116). In addition, more frequent fires would have made the woody vegetation less prominent than during the last century or so (Diggs et al. 2006; MacRoberts et al. 2002). Commercial harvesting has resulted in significant changes in Pineywoods vegetation, with plantations of loblolly pine replacing shortleaf and longleaf stands. Nonetheless, modern equivalents exist for most prehistoric plant communities in East Texas (Diggs et al. 2006:87).

Pollen studies indicate that use of the modern vegetation zones described above is appropriate for understanding the plants and attendant animal resources available to people during the first and second millennia A.D.. Weakly Bog, situated in the Post Oak Savannah vegetation region south of Anderson County, provides some of the best data for vegetation reconstruction in the eastern half of Texas during the last 3,000 years (Bousman 1998). Pollen profiles from this bog indicate oak and later oak/hickory woodlands, suggesting that modern plant communities generally provide good analogs for historical Texas plant communities during the last 3,000 years. A recent study by Bruce Albert in southwest Upshur County provides supporting data for the period of occupation at Pace McDonald (Albert 2007, 2011). Some fluctuations in rainfall and temperature have taken place (Bousman 1998:204), however. Spikes in grass pollen at approximately 500 B.P. and 1500 B.P. suggest drier conditions during those times (Bousman 1998), both before and after the Caddo occupation at the site. Most notably, such changes would have altered the location of the Pineywoods-Post Oak Savannah edge (Bousman 1998:204).

EARLY ARCHEOLOGICAL INVESTIGATIONS

One key aspect of our work is to understand the characteristics of the Caddo material culture from the Pace McDonald site, since this will have a large bearing on the age of the Caddo occupation, which

has been a matter of dispute for some years. In this section is summarized the results and findings from a recent examination of the site's prehistoric artifacts (especially its prehistoric Caddo artifacts) in the collections of the Texas Archeological Research Laboratory at the University of Texas at Austin (TARL).

Previous Investigations at the Pace McDonald Site

Limited archaeological investigations at the Pace McDonald site since the 1930s indicates that the site covers ca. 11 acres (45,000 m^2) of the upland landform adjacent to Mound Prairie Creek. The site has two deliberately constructed prehistoric Caddo earthen mounds, a large and associated habitation area (including several midden areas) and surface scatters of ceramic and lithic artifacts, and probably at least one associated cemetery area (Figure 2). There are also a number of small depressions, with an average depth of 30-60 cm, visible on the landform that may represent borrow pits for sediments used by the Caddo to build the two earthen mounds. In 1978, the depressions ranged from 6.1-25 m in diameter (Thurmond 1978).

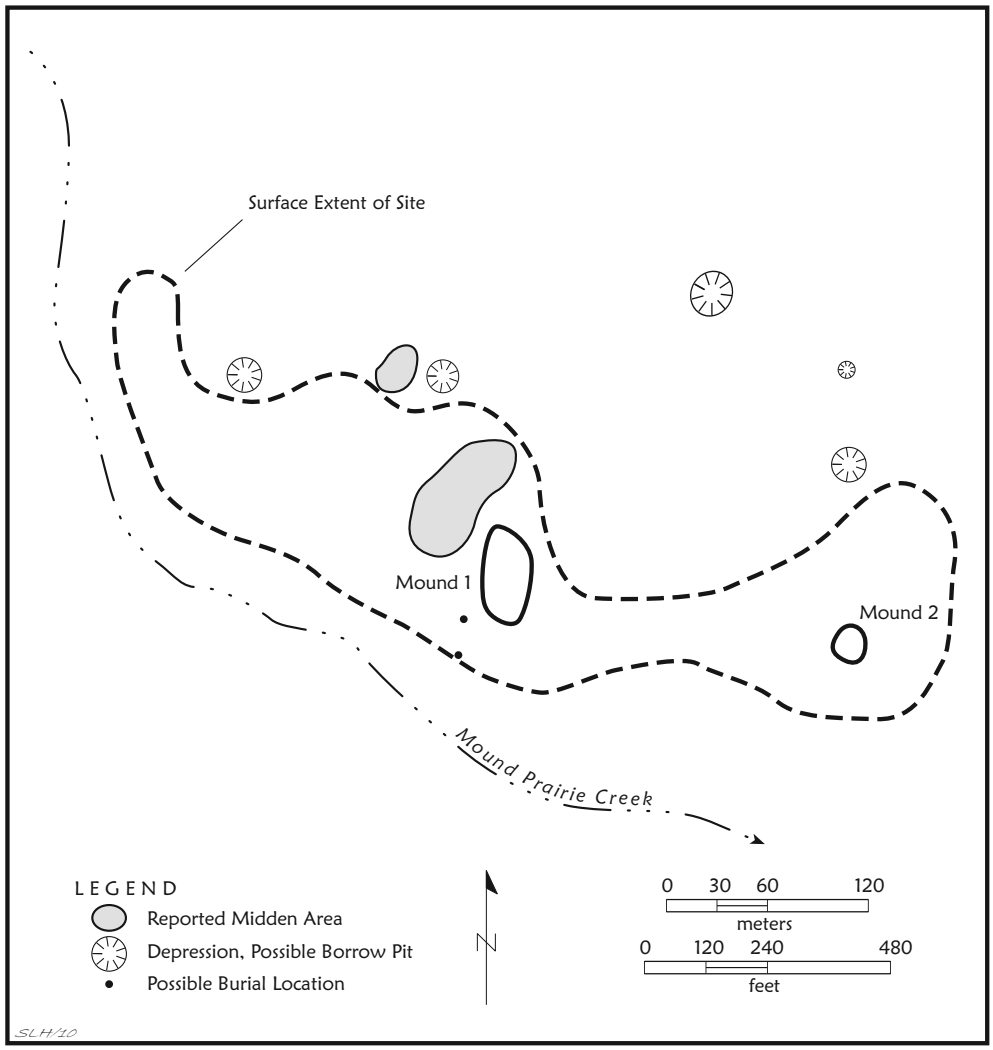


Figure 2. Map of the Pace McDonald site (41AN51), based on a 1978 sketch map by Ulrich Kleinschmidt and Pete Thurmond, and other information in the Texas Archeological Research Laboratory, The University of Texas at Austin files.

Archaeologists from the Department of Anthropology at The University of Texas at Austin (UT) conducted surface collections and test excavations at the Pace McDonald (or Royal Place) site in September 1933 (Pearce and Jackson 1933). They noted two mounds, Mound No. 1 and Mound No. 2, spaced about 280 m apart, in the field, as well as a surface scatter of ceramic and lithic artifacts, especially in an area ca. 130-280 m northwest of Mound No. 1 (Pearce and Jackson 1933:6). Mound No. 1 measured 58.2 m in length (north-south) and 37.5 m in width, and stood approximately 3 m in height. Mound No. 2 was 18.3 m in diameter and stood 1.5 m in height.

UT archaeologists obtained a collection of chipped and ground stone tools as well as a ceramic pipe from Mr. George W. McIntyre, who was then living on the site and cultivating cotton on the place; he had found most of his artifacts in the area northwest of Mound No. 1. They also collected a ground stone celt ca. 46 m southeast of Mound No. 1, and a small conch shell ca. 91 m south of this same mound (Pearce and Jackson 1933:6-7).

Jackson led the excavations of both mounds. In Mound No. 1, a circular shaft ca. 2.5 m in diameter was excavated by shovel to a depth of 3.28 m below the mound surface (bs). From Jackson's descriptions, there were several mound fill zones and perhaps two Caddo house archaeological deposits in the mound. From 0-147 cm bs, there were red (0-102 cm bs) sandy clay loam and yellow (102-147 cm bs) clay mound fill or capping zones, with few artifacts; these soils appear to be Bt-horizon sediments that were collected and used to finish the earthen mound. These redistributed sediments capped a 2.5 cm thick (147.3-149.9 cm bs) sandy red clay, that was described as "fairly hard. Seemed to be a floor level as it extended at the same thickness over the entire dug area. No midden material" (Pearce and Jackson 1933:6). If this was a floor level, the structure associated with it was not used for a lengthy period of time—given the absence of midden deposits—nor was it burned down—given the apparent absence of charcoal on the floor or in the yellow clay above it—before being dismantled and covered over with 147 cm of mound deposits.

This apparent clay floor to a structure was capped above a reddish-brown sandy loam mound fill zone deposit that extended from 149.9-213 cm bs. This fill zone capped a 49 cm thick deposit (213-262 cm bs) of ash, "with charcoal, lumps of red clay and some sand. Potsherd at top of the ashes; no other midden material" (Pearce and Jackson 1933:6). This ash deposit may represent a deliberate accumulation of ash within a confined space, as with the ash mound at the A. C. Saunders site (41AN19, see Jackson 1936; Kleinschmidt 1982), or an accumulation of ash inside a structure that was burned down, as with the ash temple at the Crenshaw site (Schambach 1996). The available archaeological information from these early excavations is equivocal, but it is suspected that this deposit represents ash built up within a structure, along with the dismantled and burned remnants of that structure, mixed in with relatively clean earth.

The ashy deposits rested on a red sandy clay and red clay that extended from 262-328 cm bs in the excavations. These deposits likely represent the buried Bt horizon of the Elrose fine sandy loam soil under Mound No. 1. If that is the case, then apparently the immediately overlying ash accumulation rested on a prepared surface wherein the A-horizon was scraped away first (a common Caddo practice in and under locations where earthen mounds are to be built), as there are no buried A-horizon (a fine sandy loam) underlying the ash deposit.

A "test hole" of unknown size was excavated by Jackson in Mound No. 2 (Pearce and Jackson 1933:10). These explorations encountered a thick layer of hard-packed ash between 15-56 cm bs, with gravels and lumps of red clay, but no apparent midden materials. The deposits above that (0-15 cm bs) appear to represent the plowed portion of the ash deposit. As with the concentrated ash deposit encountered in Mound No. 1 between 213-262 cm bs, the Mound No. 2 ash zone probably also represents a deliberate accumulation of ash within a confined space, such as a building, or an accumulation of ash inside a structure that was likely dismantled, abandoned, and destroyed. This deposit may represent ash built up within a structure, along with the dismantled (but not burned) remnants of that structure, mixed in with relatively clean earth.

The ash deposit rested atop a 43 cm thick (56-99 cm bs) zone of thin lenses (1-8 cm) of red and yellow clay and sandy soil, probably mound fill zones. Immediately below the ash, however, Pearce and Jackson (1933:10) noted there was a 20 cm thick (56-76 cm bs) red clay zone; this may represent the initial mound platform of Mound No. 2, or the initial mound platform included both the red clay as well as the underlying red sandy lens (76-99 cm bs) if the latter does not represent a buried A-horizon underneath the mound). Excavations continued to 152 cm bs, and the sediments encountered there were described by Pearce and Jackson (1933:10) as a "bluish mixture bearing streaks of yellow, red and gray. The bluish-gray clay-like composition is sticky and has a greasy feel." This deposit under the mound may represent undisturbed C-horizon deposits.

The next archaeological investigations at the Pace McDonald site did not take place until the late 1970s when Pete Thurmond and Ulrich Kleinschmidt examined the site and took a surface collection, made a pace map of the surface distribution of prehistoric artifacts, the two earthen mounds, and the locations of several possible small borrow pits (see Thurmond 1978; see also Figure 2). They noted that the site appeared to be well-preserved, with little evidence of looting at that time. This work led to the placement of the Pace McDonald site on the National Register of Historic Places a few years later, and the purchase of one acre containing Mound No. 1 by the Texas Historic Commission in the early 1980s.

Despite the absence of professional archaeological work at the site between 1933-1978, the Pace McDonald site had not been forgotten by East Texas Caddo archaeologists. Alex D. Krieger, University of Texas archaeologist, had examined the collections obtained by A. T. Jackson from the site as part of his renowned study of the early Caddo mound center at the George C. Davis site (41CE19; Newell and Krieger 1949:196). According to Story (2000:22), Krieger "believed that both the Alto and Frankston foci were represented at the site, but also recognized that it had not been adequately explored."

Following the 1978 surface investigations by Thurmond and Kleinschmidt at the Pace McDonald site, these archaeologists returned to the site in March 1981 to investigate the reported erosion on the back slope of Mound No. 1. While they were there, they obtained a surface collection of artifacts from Mound No. 1 and an area to the northwest of the mound.

In March 1984, Kleinschmidt and Susan Lisk of The University of Texas at Austin inspected the site, noting that there were three pot holes (ca. 0.9 m in depth) in Mound No. 1, and also noting that a one lane oil top road had been built that crossed the site. This road had cut through a 10 cm thick midden area ca. 250 m north of Mound No. 1, in the vicinity of possible borrow pit depression 5 (see Figure 2). A second midden area had been encountered by local collectors and landowner who were building a fence just west of Mound No. 1 (see Figure 2). Finally, Kleinschmidt and Lisk were told by local collectors that several prehistoric Caddo burials had been reportedly discovered and excavated at the site.

More information on the reported burials was provided in 1985 and 1986 by another local amateur archaeologist who was familiar with the Pace McDonald site and other archaeological sites along Mound Prairie Creek (TARL files). This amateur archaeologist obtained information that three prehistoric Caddo burials (Burials 1-3) had been excavated not far to the west and south of Mound No. 1 (see Figure 2). These burials were in grave pits approximately 75-90 cm deep that were oriented east-west or north-south; the human remains were reported to be in a poor preservation condition. The Caddo burials had funerary offerings, including plain and decorated ceramic jars, bowls, and bottles (n=9, 1 to 4 vessels per burial) and stone artifacts: a celt, a hammerstone, a pitted stone, and nine round stones (possible polishing stones?). Jan Guy of TARL identified three of the vessels from Burials 1 and 2 as a Hickory Engraved bottle, a cf. Bowles Creek Plain bowl, and a cf. Weches Fingernail Impressed, *var. Alto* bowl (see Stokes and Woodring 1981:185-186 and Figures 22m and 23b-c); there were no photographs available of the vessels from Burial 3. Jan Guy (TARL Pace McDonald files, 3/86) suggested that the vessels "date to either the early or Middle Caddoan periods." None of these funerary objects have been properly documented, and it is currently unknown who has control of these artifacts from the Pace McDonald site.

Finally, the last mention in the records at TARL of a professional investigation of the Pace McDonald site before our 2010-2011 investigations was a visit by personnel from the Office of the State Archeologist at the Texas Historical Commission in March 1996. They noted that Mound No. 1, owned by the Texas Historical Commission, was badly overgrown.

Collections at the Texas Archeological Research Laboratory

The prehistoric artifacts from the Pace McDonald site in the Texas Archeological Research Laboratory collections consists of a variety of ceramic and lithic artifacts. The ceramics include plain and decorated ceramic vessels sherds (n=975) and a ceramic pipe. There are also chipped stone tools in the collection, including dart points (n=44), arrow points (n=31), two bifaces, and a single flake tool, as well as ground stone tools (n=6), and lithic debris (n=11). The collection also contains animal bone (n=5) and a single unmodified marine conch shell.

Ceramic Vessel Sherds

Combining the various TARL collections obtained from the Pace McDonald site from the early 1930s to the mid-1980s, including surface collections, the 1933 excavations, and donated collections, the collections from the site amount to a total of 975 ceramic vessel sherds. Approximately 77% of the vessel sherds are from undecorated vessels or the undecorated portions of decorated vessels; 22.6% of the sherds, including both fine wares (engraved and red-slipped sherds) and utility wares (wet paste decorations), are decorated (Table 1).

Table 1. Ceramic Vessel Sherds in the TARL collection from the Pace McDonald site.

Sherd Type	No.	Percent
Plain rim	15	1.6
Plain body	679	69.2
Plain base	61	6.2
Subtotal, Plain sherds	755	77.4
Decorated fine ware	50	5.1
Decorated utility ware	170	17.5
Subtotal, Decorated sherds	220	22.6
Totals	975	100.0

Plain to decorated sherd ratios (P/DR) from numerous Caddo sites in East Texas appear to hold considerable promise as an independent means of establishing the age of Caddo ceramic-bearing components (provided samples of plain and decorated sherds are larger than about 200-300 sherds per site; the Pace McDonald site meets this data threshold). When P/DR ratios from different ceramic assemblages can be linked with absolute ages as established by radiocarbon dating from those assemblages, this should allow further refinements in how P/DR ratios change through time in East Texas Caddo sites. Looking at Early Caddo to Historic Caddo ceramic assemblages in the region through time, ceramic assemblages

have lower proportions of undecorated sherds through time and thus a lower P/DR ratio (Perttula 2008a:9, 315-317). Analyzed pre-A.D. 1200 sites (n=3 assemblages) have plain/decorated sherd ratios that range between 2.97-4.80. Middle Caddo sites (ca. A.D. 1200-1450, n=7) have ratios that range between 1.30-2.65. In known Late Caddo sites (n=11) in the Neches, Angelina, and Sabine river basins, by contrast, the P/DR ranges from only 1.30-0.47. Finally, post-A.D. 1680 Caddo occupations in the Neches-Angelina river basin have P/DR ratios that range from 0.20-0.30. The plain to decorated sherd ratio (P/DR) in the TARL collection is a relatively high 3.43 at Pace McDonald, suggesting the ceramic assemblage may date from pre-A.D. 1200 times; the decorated sherd assemblage, however, suggests a post-A.D. 1200 age (see below).

There are 39 rim sherds in the vessel sherd collection. More than 51% are from decorated utility ware vessels (n=20); another 38.5% are from plain vessels (n=15), and only 10.3% are from fine ware vessels (n=4, from both engraved and red-slipped vessels). One bowl or carinated bowl with interior and exterior red-slipped surfaces has a distinctive Redwine mode rim treatment (see Walters 2010:78).

About 23% of the decorated sherds are from fine wares, almost equally divided between engraved and red-slipped categories (Table 2). The utility wares are about three times as abundant as the fine wares, with the principal decorative method categories including sherds with incised, tool punctated, fingernail punctated, and incised-punctated elements.

Table 2. Decorated Sherds in the TARL collection from the Pace McDonald site.

Decorative Method	No.	Percent
Fine Ware		
Engraved	29	13.2
Engraved-red slipped	1	0.5
Red-slipped	20	9.1
Utility Ware		
Incised	74	33.6
Tool punctated	37	16.8
Fingernail punctated	24	10.9
Incised-punctated	12	5.5*
Circular punctated	8	3.6
Brushed	5	2.3
Pinched	4	1.8
Linear punctated	3	1.3
Cane punctated	1	0.5
Appliqued	1	0.5
Appliqued-punctated	1	0.5
Totals	220	100.0

*There is also one incised-punctated vessel section comprised of 12 body sherds and one rim sherd; it is not included in the total number of decorated sherds.

The fine ware sherds from the Pace McDonald site have both red-slipped (40% of the fine ware sherds), red-slipped and engraved (2%), and engraved (58%) decorative elements (Table 3). The proportion of red-slipped sherds (from bottles and bowls/carinated bowls, especially the latter) is considerable for an upper Neches River basin Caddo site (Perttula 2008b). In East Texas generally, the manufacture and use of red-slipped pottery unembellished with engraved decorations is most commonly seen in Middle Caddo ceramic traditions, whether it be in Caddo sites on the Red River or in parts of the upper Sulphur, Big Cypress, and Sabine River basins. Seventy percent of the red-slipped sherds are slipped on both the exterior and interior surfaces, while 25% are slipped only on the exterior surfaces; these latter sherds are from bottles. Sherds from vessels slipped only the interior vessel surface (probably bowls) are not common (5%).

Table 3. Decorative elements in the fine ware sherds in the TARL collections from the Pace McDonald site.

Decorative elements	No.	Percent
Interior red slip	1	2.0
Interior/exterior red slip*	14	28.0
Exterior red slip**	5	10.0
Straight engraved line	5	10.0
Straight engraved line and hatched pendant triangle	1	2.0
Parallel engraved lines, widely-spaced	1	2.0
Parallel engraved lines, excised pendant triangles, hatched band, and hatched triangle**	1	2.0
Horizontal and diagonal lines	1	2.0
Horizontal line and diagonal hatched triangle	1	2.0
Horizontal line and cross-hatched engraved pendant triangle+	1	2.0
Opposed engraved lines	1	2.0
Vertical and diagonal opposed lines+	1	2.0
Hatched curvilinear zone	1	2.0
Hatched oval++	1	2.0
Hatched straight zone	1	2.0
Hatched triangular zone	2	4.0
Engraved panel with diagonal and widely-spaced lines**	1	2.0
Opposed engraved panels**	1	2.0
Cross-hatched engraved lines	4	8.0
Cross-hatched engraved triangles**	1	2.0
Curvilinear engraved line	1	2.0
Curvilinear engraved lines and hatched triangles**	1	2.0
Curvilinear engraved line and ext. red slip**	1	2.0
Curvilinear and parallel engraved lines	1	2.0
Oval engraved lines	1	2.0
Total	50	100.0

*includes one Redwine mode rim; **bottle sherds; +=rim sherd; ++=lip notched rim

There are a wide variety of engraved decorative elements in the Pace McDonald fine ware ceramics (see Table 3). Of those that have more than just straight or parallel lines of uncertain orientation, this includes cross-hatched engraved lines; sherds with various kinds of hatched (Figure 3b, d, f-g, i, k-l) or cross-hatched (Figure 3a, h) elements. One distinctive bottle sherd has excised pendant triangles and hatched zones and hatched triangles (Figure 3e). Other distinctive engraved sherds in the assemblage include a body sherd with panels filled with opposed diagonal engraved lines (Figure 3c) and a rim with vertical and opposed diagonal engraved lines (Figure 3j).

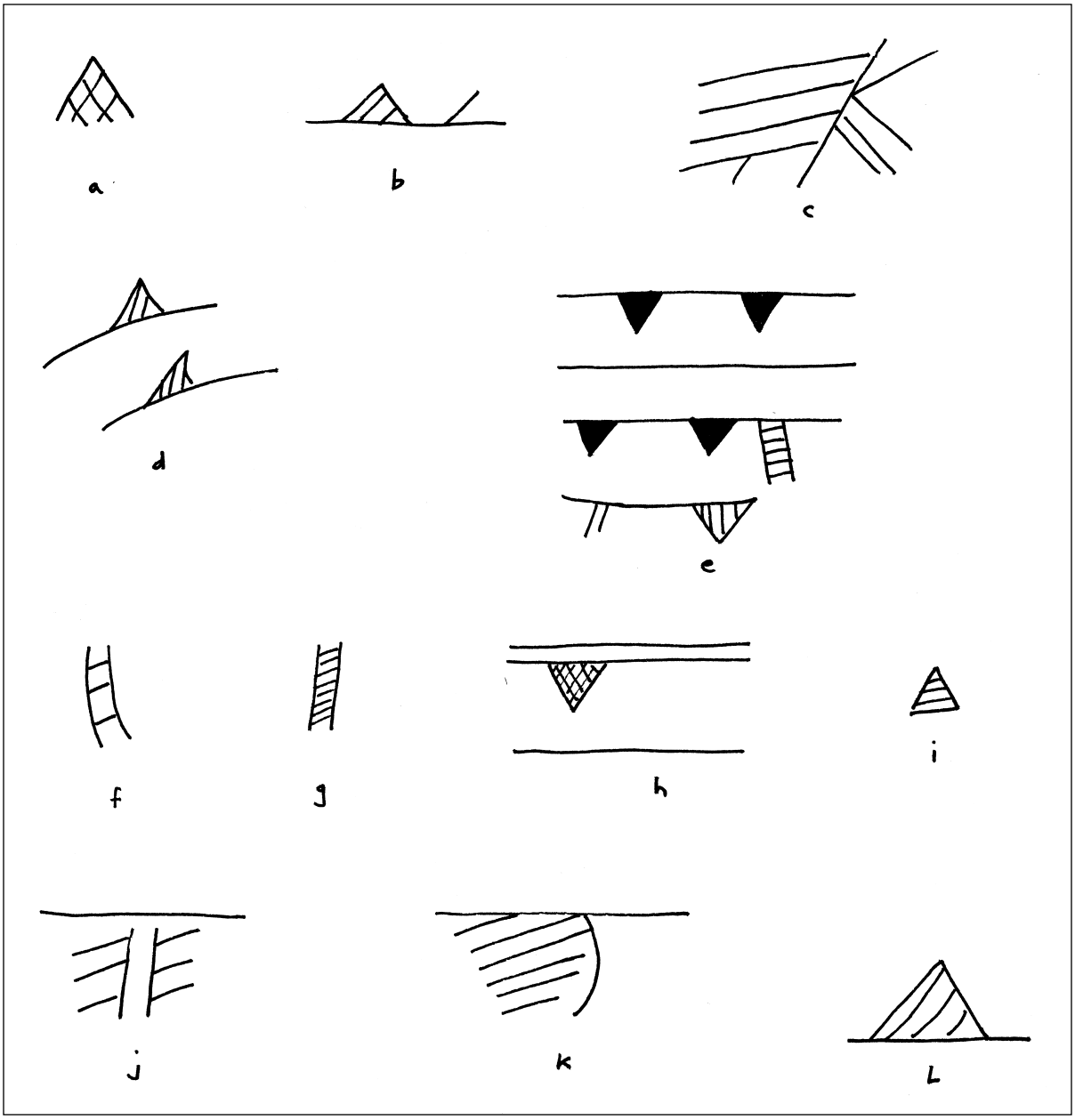


Figure 3. Selected decorative elements on engraved fine ware sherds from the Pace McDonald site: a, cross-hatched triangle; b, straight line and hatched pendant triangle; c, panels with opposed diagonal lines; d, curvilinear line with hatched triangles; e, parallel lines, excised triangles, hatched band, and hatched triangles; f, hatched curvilinear zone; g, hatched straight zone; h, horizontal lines and cross-hatched pendant triangle; i, hatched triangle; j, vertical and diagonal opposed; k, hatched oval; l, horizontal line and diagonal hatched triangle.

Notably absent in the engraved fine wares at the site are types such as Holly Fine Engraved, Spiro Engraved, or Hickory Engraved (Suhm and Jelks 1962). These fine ware engraved types are considered material culture hallmarks of the Early Caddo period (as well as various decorated utility wares), and the Alto phase (e.g., Story 2000:14) in East Texas. Their absence at the Pace McDonald site certainly would be indicative of the fact that the Caddo occupation here postdates the Early Caddo period, at probably the end of the Alto phase, which Story (2000) suggests is around or slightly after ca. A.D. 1300.

Among the Pace McDonald utility ware sherds are several different kinds of decorative methods represented, as well as distinctive decorative elements within each of the larger decorative methods classes (Table 4). These principally include sherds from vessels decorated with incised lines (43.5% of the utility wares), sherds with punctated elements (42.9%), and sherds from vessels decorated with incised-punctated elements (7.1%). Minor decorative methods documented in the site's utility wares are brushed (2.9%), pinched (2.4%), and appliqued (1.2%) categories (Table 4).

Among the incised utility wares, the most popular decorative elements include widely-spaced cross-hatched lines (likely either from Canton Incised or Dunkin Incised vessels), opposed incised lines (Figure 4h, also probably from Canton Incised or Dunkin Incised vessels), parallel or straight incised lines of uncertain orientation (possibly body decorative treatments), and diagonal or horizontal incised lines on the vessel rim. These incised sherds may be from Davis Incised, Dunkin Incised, or Canton Incised vessels, or from other Caddo ceramic types with incised elements that have not been identified to date in the region. Most of the incised rim sherds in the assemblage are from cross-hatched incised vessels (see Table 4).

Table 4. Decorative elements in the utility ware sherds in the TARL collection at the Pace McDonald site.

Decorative methods and elements	No.	Percent
Appliqued fillets	1	0.6
Appliqued fillets and tool punctated rows	1	0.6
Subtotal, appliqued	2	1.2
Brushed, parallel	5	2.9
Subtotal, brushed	5	2.9
Cross-hatched incised lines+++	22	12.9
Diagonal incised lines*	4	2.4
Dunkin Incised	1	0.6
Horizontal incised lines*	2	1.2
Incised zone	2	1.2
Opposed incised lines	15	8.8
Parallel incised lines	19	11.2
Straight incised line	9	5.3
Subtotal, incised	74	43.5
Vertical pinched ridges+	4	2.4
Subtotal, pinched	4	2.4

Table 4. Decorative elements in the utility ware sherds in the TARL collection at the Pace McDonald site, cont.

Decorative methods and elements	No.	Percent
Cane punctated	1	0.6
Circular punctated, large	6	3.5
Circular punctated, small	2	1.2
Fingernail punctated rows/zone	24	14.1
Linear punctated rows	3	1.8
Tool punctated rows/zone++	36	21.2
Tool punctated, single	1	0.6
Subtotal, punctated	73	42.9
Diagonal incised lines and cane punctated* filled triangles	2	1.2
Diagonal incised line above tool punctated zone	1	0.6
Horizontal incised line above tool punctated zone	1	0.6
Horizontal incised line above fingernail punctates (on body)	1	0.6
Incised zone filled with cane punctates	1	0.6
Opposed incised lines and tool punctated zone	1	0.6
Opposed diagonal incised lines and tool punctated-filled triangles	2**	1.2
Straight incised line adjacent to zone of small circular punctates	2	1.2
Weches Fingernail Impressed, *var. Weches*	1	0.6
Subtotal, incised-punctated	12	7.1
Totals	170	100.0

*all rim sherds; **one rim sherd, also includes a vessel section of 13 conjoined rim and body sherds; +includes one rim sherd; ++includes three rims; +++includes six rims

The punctated sherds from the site are comprised of a mixture of tool (55% of the punctated sherds, including tool punctations arranged in linear rows), fingernail (33%), large and small circular (11%), and cane (1%) punctated elements (see Table 4). The only punctated rim sherds (n=3) have rows of tool punctations on them. The majority of punctated sherds are body sherds, indicating that the bodies of many utility ware vessels are decorated with punctations; the decoration on the rims of these vessels was probably not punctated, but more likely had incised decorative elements (cf. Dunkin Incised or Weches Fingernail Impressed), typical of Caddo utility wares that have different rim and body decorations.

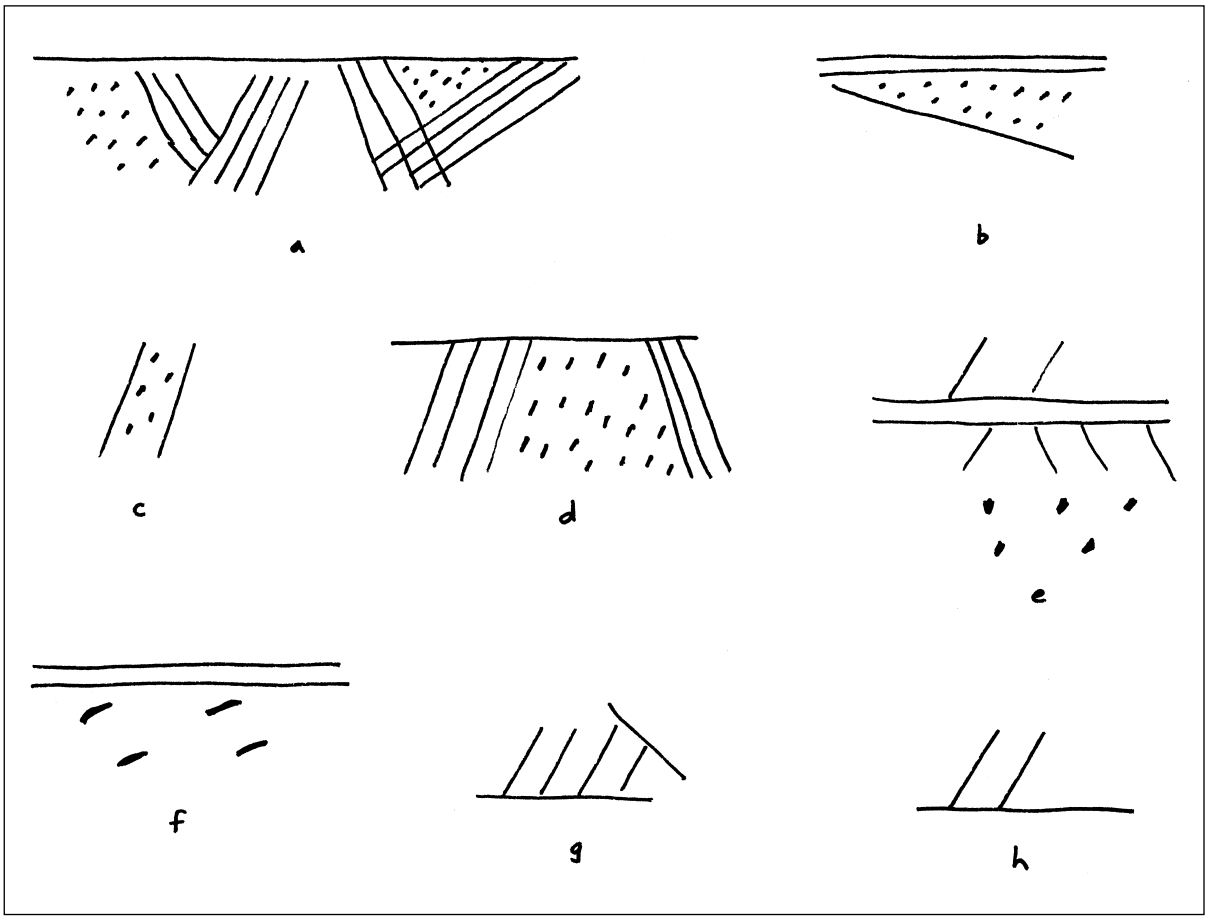


Figure 4. Selected decorative elements on utility ware sherds from the Pace McDonald site: a, opposed diagonal incised lines and tool punctated-filled triangles (Vessel Section); b, horizontal and diagonal incised lines and cane punctated-filled triangles; c, incised zone filled with cane punctates; d, opposed diagonal incised lines and tool punctated-filled triangles; e, opposed incised lines above a tool punctated zone; f, horizontal incised lines above fingernail punctates (on the vessel body); g, opposed incised (hatched triangle); h, opposed incised.

The incised-punctated sherds at the Pace McDonald site, including all of the incised-punctated rim sherds and the one vessel section (see Table 4), have diagonal or opposed diagonal incised lines with associated triangular zones filled with tool punctations or cane punctations (see Figure 4a-b, d). These utility wares are likely from Canton Incised and Pennington Punctated-Incised vessels. Other sherds have a zone of punctations adjacent to simple geometric incised elements (see Figure 4e-f), with the punctated elements apparently limited to the body of the vessel and the incised elements restricted to the rim. One sherd has a narrow incised zone or band filled with cane punctations (see Figure 4c); this decorative element has been documented on Pennington Punctated-Incised vessels (see Suhm and Jelks 1962:Plate 61d-e).

There is one Weches Fingernail Impressed, *var. Weches* body sherd (see Stokes and Woodring 1981) in the assemblage. This particular sherd has crescent-shaped punctated elements above or adjacent to a single straight incised line.

A distinctive characteristic of the Pace McDonald utility wares is the occurrence of sherds from brushed, pinched, and appliqued jars, but only in low frequencies (see Table 4). These three categories of decorated utility wares together comprise only 6.5% of the assemblage. They apparently represent different means of rim and/or body decoration on jars, with parallel (likely vertical) brushing on jar bodies;

vertical appliqued fillets on jar bodies; and vertical pinched rows on both the rim and body of jars. The typological identification of the brushed and appliqued wares are currently uncertain. The pinched jar sherds may be from Killough Pinched vessels (see Suhm and Jelks 1962:Plate 46f).

The very low frequency of brushed pottery at the Pace McDonald site would seem to be indicative of the fact that the site was not used in the Frankston phase (ca. A.D. 1400-1650), since brushed utility wares like Bullard Brushed account for at least 50-80% of all the decorated sherds in upper Neches River basin Frankston phase assemblages (Perttula 2011a:Table 6-38). By comparison to the Pace McDonald site, and its less than 3% brushed sherds in the decorated sherd assemblage, the well-dated A.D. 1320-1400 Middle Caddo component at the Lang Pasture site (41AN38), brushed sherds comprise 26% of the utility wares, but by the early 15th century A.D., "Caddo potters in the upper Neches River basin began to manufacture considerable numbers of jars with brushed vessel bodies and rims" (Perttula 2011a:309).

There are also three perforated body and base sherds in the Pace McDonald collection. These likely represent spindle whorls, are disk-shaped sherds (usually base sherds) that have a central perforation or hole drilled in them. The spindle whorl would have been affixed on a spindle to help maintain its rotary motion during spinning activities. The presence of spindle whorls at the Pace McDonald site suggests that Caddo women were processing fibers to produce textiles (cf. Alt 1999). Materials that could have been used include animal hair and various vegetable fibers, among them hemp, slippery elm, mulberry, milkweed, and nettle, as well as the bark of trees.

A detailed analysis of technological attributes of the Pace McDonald ceramic sherds was not conducted for this project, due primarily to time constraints and the inability to examine the sherd cores in any detail (i.e., by not being able to remove a small bit of the sherd to examine a freshly broken profile of the core). Nevertheless, it was possible to observe that the vast majority of ceramic vessel sherds from the site are from vessels tempered with grog (i.e., fired and crushed clay), occasionally in association with other tempers. This is the principal prehistoric Caddo ceramic practice in the upper Neches River valley (see Perttula 2011a:Figure 6-71). More than 14% of the sherds do have crushed and burned bone temper added to the clay paste (Table 5). Proportionally, bone temper is used most frequently in plain wares and utility wares.

Table 5. Use of bone temper in the Pace McDonald Caddo ceramic sherds in the TARL collection.

Ware	No.	Percent	No. with bone temper	Percent
Plain Ware	755	77.4	114	80.0
Fine ware	50	5.1	4	2.8
Utility ware	170	17.5	24	16.9
Totals	975	100.0	142	14.5

Ceramic Pipe

Ceramic pipes and pipe sherds are common artifacts found in upper Neches River basin Caddo sites, especially those sites occupied after ca. A.D. 1400 (Gilmore 1974; Jackson 1933, 1936; Kleinschmidt 1982). Not too surprisingly then, a complete, but undecorated, L-shaped (i.e., L-shaped angle between the bowl and the stem) elbow pipe was in the collections from the Pace McDonald site (Figure 5). The pipe is grog-tempered, and has been burnished on the exterior surface. It is 34.6 mm in height, and has a 55.6

mm stem length. The bowl orifice diameter is 23.7 mm, and the bowl itself is 3.7 mm thick. Along the stem, the exterior orifice diameter is 13.9 mm; the interior orifice diameter is 7.7 mm; and the stem is 3.1 mm thick.

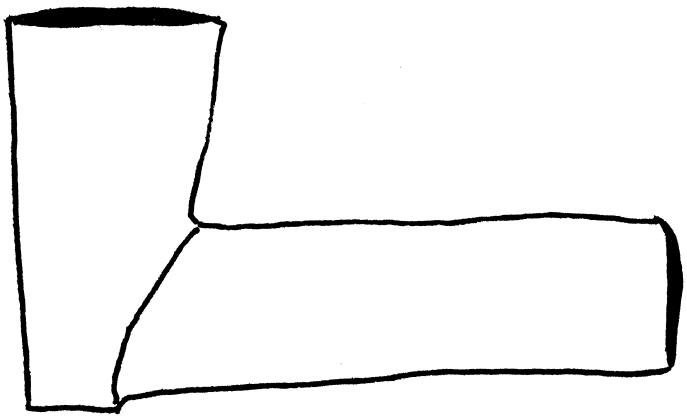


Figure 5. L-shaped elbow pipe from the Pace McDonald site.

Elbow pipes are a style of ceramic pipe manufacture that began to be popular after ca. A.D. 1350 in East Texas and elsewhere in the Caddo area (see Hoffman 1967; Rogers and Perttula 2004; Perttula 2008b), but are virtually the exclusive form of clay pipe made by the Caddo from the 15th century A.D. on. An examination of the clay elbow pipes from mortuary contexts in the upper Neches River basin (see Perttula 2011b), from cemeteries of known age, indicates that the earliest elbow pipes (Var. A) are plain L-shaped forms. Radiocarbon and thermoluminescence dates on sherds indicate that L-shaped pipes at the Lang Pasture site (41AN38) date in the 14th century A.D., from ca. A.D. 1320-1400. In other upper Neches River basin sites of known age (i.e., dating to the Frankston phase, subphase 1-3, and the Allen phase), Var. A pipes are restricted to pre-A.D. 1480 components.

ARROW POINTS

The arrow points in the TARL collection at the Pace McDonald site are dominated by parallel-stemmed Alba points (as well as a single possible Alba point preform). These account for 55% of the arrow points (Table 6). Also relatively common are contracting stem Perdiz arrow points (23%) and expanding stem and flaring barb Catahoula points (10%).

The earliest arrow point form at the Pace McDonald site is probably the Catahoula type. This point is considered diagnostic of late Woodland (ca. A.D. 700-800+) components in the East Texas and Southeast Texas regions (Shafer and Walters 2010). Alba points, on the other hand, are generally considered Formative to Early Caddo period (ca. A.D. 800-1200) arrow points, although because they are diagnostic of the Alto phase (Story 2000), they may date from as long a period of manufacture and use as ca. A.D. 850-1300. They are particularly well-represented at the George C. Davis site on the Neches River (Newell and Krieger 1949:161 and Figure 56a-h), where they are considered the only "resident type."

The later (post-ca. A.D. 1200-1300) arrow points at the Pace McDonald site are dominated by Perdiz points. Perdiz points have been found in a number of East Texas Caddo sites that date from the 13th to the 17th century A.D., but as of yet, unfortunately, no temporally distinctive varieties have been defined within this broad span of time that would permit a more definitive conclusion as to the age of this prehistoric occupation at the site.

Table 6. Arrow points from the Pace McDonald site in the TARL collection.

Type	Lithic raw Materials				
	Non-local chert	Local chert	Quartzite	Petrified wood	N
Alba	13	1	2	–	16
Possible Alba preform	1	–	–	–	1
Catahoula	–	–	2	1	3
Perdiz	6	1	–	–	7
Unidentified	3	–	–	1	4
Totals	23	2	4	2	31

The arrow points from the Pace McDonald site are predominantly manufactured from non-local cherts that are apparently from the Edwards Plateau region of Central Texas, or from Brazos and Trinity River stream gravels (see Table 6); 74% of the identifiable points are made from these materials. The Caddo knappers that lived at the site clearly had a broad range of lithic raw materials to draw upon, as 82% of the Alba points are preforms are made from non-local chert, and 86% of the Perdiz points were made from this same suite of non-local cherts. The early Catahoula stemmed arrow points were made exclusively of petrified wood and quartzite.

Dart Points

There are 44 dart points in the TARL collections from the Pace McDonald site (Table 7). The most common type is the contracting stem Gary, which accounts for 36% of all the dart points from the site. Based on the shape of the dart points, particularly their basal and stem forms, and the identification of specific dart point types with known or estimated temporal limits (e.g., Story 1990; Turner and Hester 1999), the dart points from the site were made and used in Middle Archaic (ca. 6000-3000 B.C.), Late Archaic (ca. 3000-500 B.C.), and Woodland period (ca. 500 B.C. to A.D. 800) times, primarily the latter.

The dart points from the Pace McDonald site can be grouped into temporal periods, including Woodland, Late Archaic, and Middle Archaic (Table 8). The usefulness of these groupings should be evaluated with the proviso that the majority of dart point types that occur in East Texas are not yet well-dated by secure archaeological association with a series of calibrated radiocarbon dates from features or single component archaeological deposits, but the estimated temporal periods to which the dart points from the Pace McDonald site are the product of a few calibrated dates as well as extrapolations with better dated temporal sequences in the western Gulf Coastal Plain, Central Texas, and the Ozark Highlands (cf. Schambach 1982; Story 1990; Trubitt 2009; Turner and Hester 1999). Nevertheless, the groupings follow rather closely the artifact sequences for stone tools postulated by Story (1990:Figures 32 and 33) in her synthesis of the archaeology of the East Texas portion of the Gulf Coastal Plain.

A simple comparison of the number of dart points from the site that fall into each of these periods make evident that Woodland period dart points are by far the most abundant (52.3%), particularly the Gary (n=16), Kent (n=3), and Godley (n=2) types. Late Archaic dart points comprise another 40.9% of the recovered points; these include primarily parallel stemmed and flat based projectile point forms, expanding stem points with a narrow stem and a flat base, as well as one Williams point. Middle Archaic points include one Dawson and one possible Wells specimens, along with an expanding stem form with a concave base (see Table 8).

Table 7. Dart points from the Pace McDonald site in the TARL collection.

Type	Lithic raw Materials				
	Non-local chert	Local chert	Quartzite wood	Petrified	N
Gary	8	1	5	2	16
Kent	3	–	–	–	3
Godley-like	1	–	1	–	2
Palmillas	2	–	–	–	2
Williams	1	–	–	–	1
Dawson	1	–	–	–	1
Straight stem and flat base	9	1	1	2	13
Expanding stem	1	–	–	–	1
Expanding/narrow stem and flat base	2	–	–	–	2
Expanding stem with concave base	1	–	–	–	1
Expanding to straight stem	1	–	–	–	1
Wells	1	–	–	–	1
Totals	31	2	7	4	44

Several different kinds of lithic raw materials were used in the manufacture of the dart points that ended up discarded at the Pace McDonald site, including a variety of cherts (most of non-local origin), petrified wood, and quartzite. It is clear that non-local chert raw materials were principally used in dart point manufacture during all temporal periods of occupation at the site, especially during the Middle and Late Archaic periods (see Table 8). Local cherts, quartzite, and petrified wood gradually became more important for dart point manufacture during and after the Late Archaic period, while the use of cherts diminished from 100% to 77.8% in the Middle and Late Archaic periods to 60.9% in the Woodland period.

These trends in the use of lithic raw materials, particularly the non-local cherts that most likely were from gravels that originated from source areas to the west in Central Texas and the Edwards Plateau, suggest that the aboriginal populations that utilized the Mound Prairie Creek area prior to ca. 1200 years ago had access to a wide range of non-local lithic raw materials. This is probably because they were relatively mobile foraging populations that ranged west into the Trinity and Brazos River valleys—where high quality cherts could be obtained from gravel sources—and where they collected these high-quality lithic resources during the course of their settlement and foraging forays. Locally available lithic raw materials became more important as sources of chipped stone tools during the Woodland period. These later groups that used the Pace McDonald site likely had a more territorially-confined settlement/foraging area in the East Texas Pineywoods, although certainly there were contacts between Pineywoods Woodland groups and peoples living in areas with high quality chert raw materials that led to the continued and extensive acquisition of non-local chipped stone for tool manufacture and use.

Table 8. Summary of dart points by period from the Pace McDonald site in the TARL collection, including the percentage of dart points made from non-local cherts.

Type and Period	No.	Percent	Percent of non-local chert
Woodland			
Gary	16	36.4	50.0
Kent	3	6.8	100.0
Godley	2	4.5	50.0
cf. Palmillas	2	4.5	100.0
Sub-total	23	52.3	60.9
Late Archaic			
parallel stemmed	13	29.5	69.2
Williams	1	2.3	100.0
expanding stemmed	4	9.1	100.0
Sub-total	18	40.9	77.8
Middle Archaic			
Dawson	1		100.0
cf. Wells*	1		100.0
expanding stem, concave base	1		100.0
Sub-total	3	6.8	100.0
Totals	44	100.0	70.5

*no edge grinding

Bifaces

Both of the two large bifaces in the collection are made from a non-local chert. These bifaces are probably discarded fragments from the attempted manufacture of bifacially chipped dart points.

Flake Tool

A single flake tool with unilateral use wear is in the Pace McDonald collection. This expedient tool was made from a non-local (Edwards Plateau?) dark gray chert.

Ground Stone Tools

The ground stone tools in the collection are a disparate lot, with a grooved axe, a polished stone, a mano, and three celts (Table 9); the mano and polished stone are made from locally available lithic raw materials. The grooved axe probably represents a Middle to Late Archaic use of the site, as those are the time periods when this tool type was predominantly used by East Texas prehistoric peoples (cf. Turner 2006). The axe is made from a grayish-black diorite or tuff from a Ouachita Mountains source area, and has been broken above the groove. It is 60.4 mm wide at the groove, 69.7 mm from the groove to the bit, 38.2 mm wide, and the bit width is 65.7 mm.

Table 9. Ground stone tools in the Pace McDonald collection at TARL.

Tool type	Ouachita Mountains raw material source	Quartzite	Ferruginous sandstone
Celt	3	–	–
Grooved axe	1	–	–
Mano	–	–	1
Polished stone	–	1	–
Totals	4	1	1

The cobble-sized mano has been ground smooth on both surfaces from use on a metate or grinding slab. The quartzite polished stone was probably used to polish and finish ceramic vessels made at the site; it is 46.2 mm in length, 32.3 mm in width, and 12.2 mm thick. The temporal association of these tools is unknown, but the use of such tools would not be unexpected in prehistoric Caddo times.

The three celts are associated with the prehistoric Caddo occupation of the Pace McDonald site. They are made on Ouachita Mountains raw materials, including greenish-gray siliceous shale, tuff or diorite, or graywacke. The tools are completely polished on the body and bit, with either flat (n=2) or rounded (n=1) poll ends. Th celts range in length from 80.3-206.4 mm; width ranges are 37.2-81.7 mm; thickness ranges are 32.2-51.4 mm; and bit widths range from 32.1-75.0 mm.

Lithic Debris

The small amount of lithic debris in the Pace McDonald collections (Table 10) indicate that the knapping of stone tools took place at the site, but was not apparently a common activity. Both local (45%) and non-local (55%) raw materials are represented in the lithic debris.

Table 10. Lithic debris from the Pace McDonald site in the TARL collection.

Raw Material	Cortical	Non-Cortical	N
Non-local chert			
dark gray chert	–	1	1
brownish-gray chert	1	1	2
gray chert	–	1	1
grayish-brown chert	1	–	1
brown-black chert	1	–	1
Local lithic raw materials			
Hematite	–	1	1
Quartzite	2	1	3
Petrified wood	–	1	1
Totals	5	6	11

The non-local lithic debris includes several different colors of chert, including several with a stream-rolled cortex, that likely originated in the Edwards Plateau area of Central Texas, and cobbles and pebbles of this material can be found in stream gravels well to the east of the Plateau, including the Brazos and Trinity River drainages. The local lithic raw materials are also available in local stream gravels, most likely in the Neches River valley. The one local hematite flake in the Pace McDonald collection appears to be a ground stone tool manufacture or resharpening piece.

Marine Shell

A small, pitted/etched, and unmodified marine conch shell is in the collection from the Pace McDonald site, but its provenience within the site is unknown. The conch is 73.3 mm in length and 49.0 mm in width.

Animal Bone

There are five unidentifiable pieces of animal bone in the collections. One of these has been burned.

2010-2011 Archeological Investigations

Our work at the Pace McDonald site was initiated by an April 2010 surface reconnaissance of the Sanford lands at the site, and the surface collection of artifacts exposed there following shallow disking of several tracts within the known boundaries of the site. Mr. Sanford primarily uses his property for cattle grazing, although he regularly disks portions of his property for winter pasture and garden plots. Surface visibility was fair to good on most investigated portions of his property.

Based on the surface collecting work in April 2010, it became apparent that the main concentration of surface artifacts on the Sanford lands at the Pace McDonald site was in a ca. 150 x 150 m area (5.5 acres) north of Mound No. 1, the mound owned by the Texas Historical Commission (Figure 6). This concentration apparently extends to the north and west off of the Sanford lands an unknown distance, but probably at least another 100+ m to the west on the landform and towards Mound Prairie Creek (see Figure 2; Thurmond 1978; Perttula 2011b). Midden deposits have been previously noted in this same area, as well as a possible borrow pit depression (see Figure 2). The density of Caddo artifacts is very low in surface contexts east of Mound No. 1 and especially around Mound No. 2, as had been previously noted by Thurmond (1978).

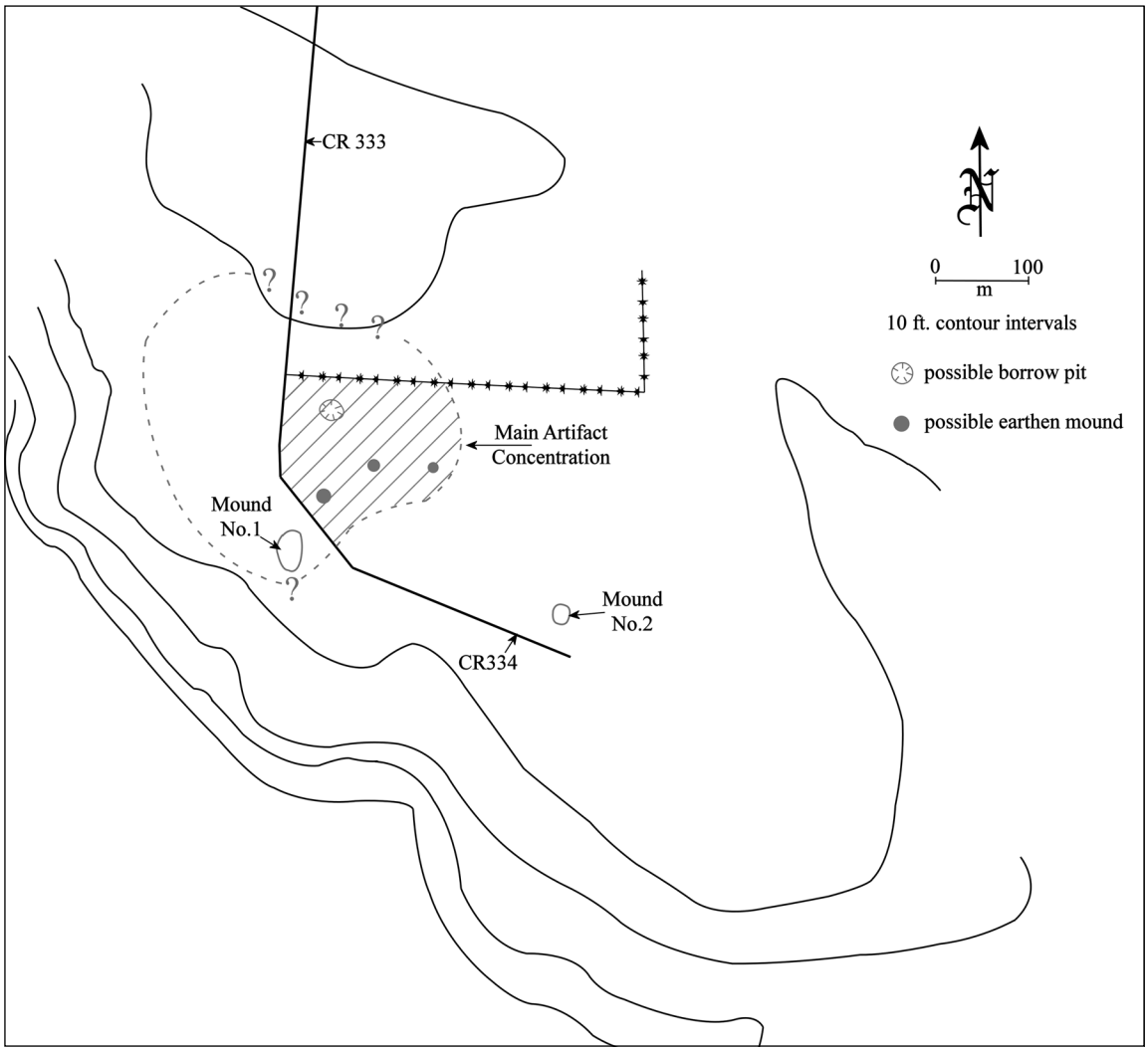


Figure 6. Visible features and artifact concentrations at the Pace McDonald site, April 2010.

Amidst the primary artifact concentration north and northeast of Mound No. 1 are three possible low mounds (see Figure 6), each about 40 m in diameter and 1 m in height. These possible mounds are approximately the same size as Mound No. 2 appears in 2010, though it was estimated at only 18.3 m in diameter in 1933 (Pearce and Jackson 1933). These mounds and possible mound features have been plowed down and spread out over the years.

ARTIFACT ASSEMBLAGE FROM THE APRIL 2010 SURFACE COLLECTION

The artifacts found in the April 2010 surface collections at the Pace McDonald site are dominated by prehistoric Caddo ceramic sherds and lithic debris (Table 11). There is only a limited range of other artifact categories represented in the surface collection assemblage, including burned clay, chipped stone tools, animal bones, and a small assortment of 19th century Anglo-American artifacts.

Table 11. Artifacts recovered in the April 2010 surface collection at the Pace McDonald site.

Artifact Category	No.	Percent
Caddo Ceramic Sherds	382	86.6
Burned Clay pieces	1	0.2
Chipped Stone Tools	2	0.5
Prehistoric Lithic Debris	42	9.5
19th Century Historic Artifacts	9	2.0
Animal bones, burned	5	1.1
Totals	441	100.0

Ceramic Vessel Sherds

Approximately 78% of the vessel sherds in the April 2010 surface collection are from undecorated vessels or the undecorated portions of decorated vessels; 21.7% of the sherds, including both fine wares (engraved and red-slipped sherds) and utility wares (wet paste decorations), are decorated (Table 12). These proportions are almost identical to that documented in the larger assemblage of Caddo ceramic sherds in the TARL collection (see Table 1).

The plain to decorated sherd ratio (P/DR) in this surface-collected assemblage is 3.60. The P/DR in the TARL collections from Pace McDonald is 3.43, clearing indicating that both collections derive from the same prehistoric Caddo sherd sample, a sample with a high proportion of plain sherds, likely plain vessels, and/or vessels with decorations confined principally to the rim, rather than being decorated commonly on the vessel rim and body. Combining the TARL and April 2010 surface collection assemblages (n=1357 sherds), the P/DR at the Pace McDonald site is 3.48 (i.e., only about 22% of the sherds are decorated).

There are 13 rim sherds in the 2010 surface collection of vessel sherds. More than 53% are from plain ware vessels (n=7); another 30.8% are from decorated fine ware vessels (n=4, engraved vessels), and only 15.4% are from utility ware vessels). If we combine the TARL and 2010 surface collection sherds, the 52 rim sherds are distributed amongst the three wares as follows: plain ware (n=22, 42.3%); utility ware (n=22, 42.3%); and fine ware (n=8, 15.4%); plain wares and utility vessels are clearly the predominant wares at the Pace McDonald site.

Table 12. The Caddo ceramic sherd assemblage in the April 2010 surface collection.

Sherd Type	No.	Percent
Plain rim	7	1.8
Plain body	276	72.2
Plain base	16	4.2
Subtotal, Plain sherds	299	78.2
Decorated fine ware	29	7.6
Decorated utility ware	54	14.1
Subtotal, Decorated sherds	83	21.7
Totals	382	99.9

In the 2010 surface collections from the Pace McDonald site, fine wares are well represented (35%) in the decorated sherd sample (Table 13). Slightly more than half of the fine wares have engraved decorations, with the remainder comprised of red-slipped bottle and bowl/carinated bowl sherds. The combined TARL and 2010 sherd samples indicate that approximately 26% of the decorated sherds from the site are from fine wares, with the fine wares divided into sherds that are engraved (57% of the fine wares); engraved and red-slipped (1.3%); and red-slipped (41.8%).

The utility wares account for 65% of the April 2010 surface collection decorated sherds, and 73.9% of the combined sherd samples (see Table 13). Sherds from vessels decorated with incised, tool punctated, fingernail punctated, and incised-punctated elements are the most popular in both collections, with 43% of the utility ware sherds having incised designs (Figure 7d); 21% are tool punctated (Figure 7b); 15.6% are fingernail punctated (Figure 7c); and 8% have incised and punctated decorations (Figure 7a). Less common utility ware sherds at the Pace McDonald site have circular punctated, brushed, pinched, linear punctated, cane punctated, and appliqued decorative elements (see Table 13); together these comprise 12% of the utility ware sherds.

As with the TARL sherd sample from the Pace McDonald site (see Table 3), red-slipped sherds from bottles (i.e., those with an exterior red slip) and carinated bowls/bowls are common in the fine ware sherds in the April 2010 surface collection (Table 14). They comprise 44.8% of the fine wares in this small sherd assemblage. In East Texas, the manufacture and use of red-slipped pottery unembellished with engraved decorations is most commonly seen in Middle Caddo ceramic traditions, whether it be in Caddo sites on the Red River or in parts of the upper Sulphur, Big Cypress, and Sabine River basins as well as in parts of the Neches River basin in East Texas.

There are several different engraved decorative elements in the 2010 surface collection Pace McDonald fine ware ceramics (see Table 14). Of those that have more than horizontal engraved lines (from Hickory Engraved vessels?), or just straight or parallel lines of uncertain orientation (see Figure 7g), this includes a diagonal engraved rim sherd (see Figure 7f), a body sherd with opposed engraved lines, and two bottle sherds with curvilinear engraved lines.

There is a possible post-A.D. 1400 rim sherd from a bowl or carinated bowl with a horizontal engraved line below the lip, and that has at least two small hatched triangles pendant from that line (see Figure 7e and Table 14). This decorative element is reminiscent of at least two varieties of Hume Engraved (see Suhm and Jelks 1962:Plate 42b-c; Perttula 2011a:Figure 6-65f-g), particularly Hume Engraved, *var.*

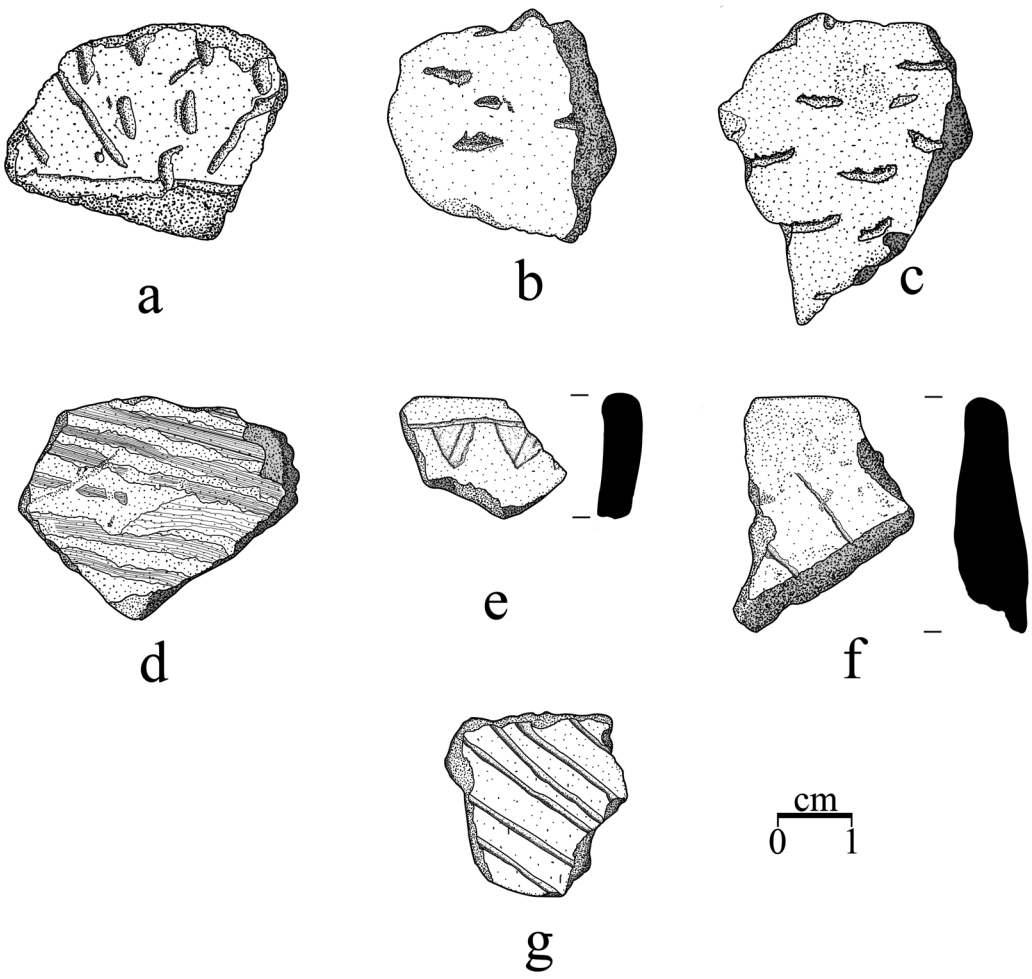


Figure 7. Selected decorated sherds from the Pace McDonald site, April 2010 surface collection: a, incised-punctated; b, tool punctated; c, fingernail punctated; d, broad parallel incised lines; e, hatched engraved triangles; f, diagonal engraved lines; g, parallel engraved lines.

Table 13. Decorated Sherds in the April 2010 surface collection compared to the TARL decorated sherd collection.

Decorative Method	TARL Collections		April 2010 Collections		Combined Samples	
	N	Percent	N	Percent	N	%
Fine Ware						
Engraved	29	13.2	16	19.3	45	14.9
Engraved-red slipped	1	0.5	–	0.0	1	0.3
Red-slipped	20	9.1	13	15.7	33	10.9
Subtotal	50	22.6	29	35.0	79	26.1
Utility Ware						
Incised	74	33.6	22	26.5	96	31.7
Tool punctated	37	16.8	11	13.3	48	15.9

Table 13. Decorated Sherds in the April 2010 surface collection compared to the TARL decorated sherd collection, cont.

Decorative Method	TARL Collections		April 2010 Collections		Combined Samples	
	N	Percent	N	Percent	N	%
Utility Ware						
Fingernail punctated	24	10.9	11	13.3	35	11.6
Incised-punctated	12	5.5*	6	7.2	18	5.9
Circular punctated	8	3.6	1	1.2	9	3.0
Brushed	5	2.3	2	2.4	7	2.3
Pinched	4	1.8	1	1.2	5	1.7
Linear punctated	3	1.3	–	0.0	3	1.0
Cane punctated	1	0.5	–	0.0	1	0.3
Appliqued	1	0.5	–	0.0	1	0.3
Appliqued-punctated	1	0.5	–	0.0	1	0.3
Subtotal	170	77.4	54	65.0	224	73.9
Totals	220	100.0	83	100.0	303	100.0

*There is also one vessel section comprised of 12 body sherds and one rim sherd; it is not included in the total number of decorated sherds.

Allen, since this variety includes bowls rather than short-necked bottles. Poynor Engraved, *var. C* (Perttula 2011a:Figure 6-64) also has small hatched pendant triangles. If either of these variety identifications are reasonable, the occurrence of this sherd would suggest a very limited use of the Pace McDonald site in Frankston phase times, after ca. A.D. 1480-1560 (Perttula 2011a:Table 6-37). A body sherd with parallel and several arcing engraved lines may be from a Poynor Engraved, *var. Cook* vessel (see Perttula 2011a:Figure 6-63d). This particular variety of Poynor Engraved is common in ca. A.D. 1400-1560 burial contexts in the upper Neches River basin (Perttula 2011a:Table 6-37).

Absent in the engraved fine wares at the site are types such as Holly Fine Engraved or Spiro Engraved (Suhm and Jelks 1962). These fine ware engraved types are considered material culture hallmarks of the Early Caddo period (along with various decorated utility wares), and the Alto phase (e.g., Story 2000:14) in East Texas. As noted above, their absence in this surface collection at the Pace McDonald site may be indicative of the fact that the Caddo occupation here postdates the Early Caddo period.

The decorated utility ware sherds in the 2010 surface collection at the Pace McDonald site are dominated by sherds from vessels decorated with punctations (44.4% of the utility wares), incised lines (40.7%), and sherds from vessels decorated with incised-punctated elements (9.3%) (Table 15). Minor decorative methods documented in the site's utility wares are brushed (3.7%) and pinched (1.9%) categories. These proportions for each decorative methods/elements categories are not significantly than the utility ware assemblage in the TARL collections from the site (see Table 4).

The punctated sherds from the site are comprised of a mixture of tool (46% of the punctated sherds), fingernail (46%), circular (4%), and crescent-shaped (4%) punctated elements (see Table 15). There are no punctated rim sherds, suggesting that the bodies of many utility ware vessels are decorated with punctations; the decoration on the rims of these vessels was probably not punctated, but more likely had

Table 14. Decorative elements in the fine ware sherds from the April 2010 surface collection at the Pace McDonald site.

Decorative elements	No.	Percent
Interior/exterior red slip	5	17.2
Exterior red slip	8	27.6
Straight engraved line	4	13.8
Straight and opposed engraved lines	1	3.4
Diagonal engraved lines*	1	3.4
Horizontal engraved lines*	2	6.9
Horizontal engraved lines+	1	3.4
Horizontal engraved line and hatched pendant triangles*	1	3.4
Opposed engraved lines	1	3.4
Parallel engraved lines, closely-spaced	2	6.9
Parallel and arcing engraved lines	1	3.4
Curvilinear engraved lines**	2	6.9
Total	29	100.0

*rim sherds; **bottle sherds; +=carinated bowl sherd

Table 15. Decorative elements in the utility ware sherds from the April 2010 surface collection at the Pace McDonald site.

Decorative methods and elements	No.	Percent
Brushed, parallel	1	1.9
Brushed, curvilinear	1	1.9
Subtotal, brushed	2	3.7
Cross-hatched incised lines	1	1.9
Diagonal incised lines*	1	1.9
Horizontal, diagonal, and opposed incised lines*	1	1.9
Opposed incised lines	1	1.9
Parallel incised lines	8	14.8
Single straight incised line	4	7.4
Straight incised line, broad line	6	11.1
Subtotal, incised	22	40.7
Vertical pinched ridges	1	1.9
Subtotal, pinched	1	1.9

Table 15. Decorative elements in the utility ware sherds from the April 2010 surface collection at the Pace McDonald site, cont.

Decorative methods and elements	No.	Percent
Circular punctated rows	1	1.9
Fingernail punctated rows/zone	4	7.4
Fingernail punctated, single	7	13.0
Tool punctated rows/zone	5	9.3
Tool punctated, single	6	11.1
Weches Fingernail Impressed, *var. Alto*	1	1.9
Subtotal, punctated	24	44.4
Opposed incised lines and tool punctated zone	1	1.9
Opposed diagonal incised lines and tool punctated-filled triangles+	1	1.9
Straight incised line adjacent to zone of tool punctates	3	5.6
Subtotal, incised-punctated	5	9.3
Totals	54	100.0

*rim sherd; +=carinated bowl sherd

incised decorative elements (cf. Dunkin Incised or Weches Fingernail Impressed), typical of Caddo utility wares that have different rim and body decorations. There is one Weches Fingernail Impressed, *var. Alto* body sherd (see Stokes and Woodring 1981:185-186 and Figures 22m and 23b-c) in the assemblage. This particular sherd has rows of crescent-shaped punctations.

Among the incised utility wares in the April 2010 surface collection, there are sherds with widely-spaced cross-hatched lines (likely either from Canton Incised or Dunkin Incised vessels), opposed incised lines (also probably from Canton Incised or Dunkin Incised vessels), parallel or straight incised lines of uncertain orientation (possibly body decorative treatments), diagonal (a rim sherd), and horizontal-diagonal and opposed incised lines on another vessel rim (see Table 15). These incised sherds may be from Davis Incised, Dunkin Incised, or Canton Incised vessels, or from other Caddo ceramic types with incised elements that have not been typologically identified to date in the region.

The incised-punctated sherds in the April 2010 surface collection sample from the Pace McDonald site have opposed or opposed diagonal incised lines with associated tool punctated zones (likely below the incised decorative element) or triangular zones filled with tool punctations (see Figure 7a). These utility wares are likely from Canton Incised and Pennington Punctated-Incised vessels. Other sherds have a zone of punctations adjacent to simple geometric incised elements, with the punctated elements apparently limited to the body of the vessel and the incised elements restricted to the rim.

A distinctive characteristic of the Pace McDonald utility wares is the occurrence of sherds from brushed and pinched jars, but only in low frequencies (see Table 15). These two categories of decorated utility wares together comprise only 5.6% of the assemblage. They apparently represent different means of rim and/or body decoration on jars, with parallel (likely vertical) or curvilinear brushing on jar bodies and vertical pinched rows on both the rim and body of jars. The pinched jar sherd may be from a Killough Pinched vessel (see Suhm and Jelks 1962:Plate 46f).

The very low frequency of brushed pottery at the Pace McDonald site is notable. Brushed utility wares like Bullard Brushed account for at least 50-80% of all the decorated sherds in upper Neches River basin Frankston phase (ca. A.D. 1400-1650) assemblages (Perttula 2011a:Table 6-38), making it clear that Pace McDonald was likely not occupied in the Frankston phase. It was only by the early 15th century A.D. that considerable numbers of jars with brushed vessel bodies and rims were made by upper Neches River basin Caddo potters.

The vast majority of ceramic vessel sherds from the site, whether in the TARL collections or the April 2010 surface collections, are from vessels tempered with grog (i.e., fired and crushed clay), occasionally in association with other tempers (such as hematite or bone). This is the principal prehistoric Caddo ceramic practice in the upper Neches River valley (see Perttula 2011a:Figure 6-71). More than 13.9% of the sherds do have crushed and burned bone temper added to the clay paste (Table 16). Proportionally, bone temper is used most frequently in the plain wares and utility wares, about twice as frequently as is the case for the fine wares.

Table 16. Use of bone temper in the Pace McDonald site Caddo ceramic sherds, TARL collections and April 2010 surface collections.

Ware	No.	Percent	No. with bone temper	Percent of total sherd sample
Plain Ware	1054	77.4	153	14.6
Fine ware	79	5.8	5	6.3
Utility ware	229	16.8	33	14.4
Totals	1362	100.0	189	13.9

Burned Clay

Only a single piece of burned clay is in the April 2010 surface collection. This piece is a product of a localized burning event at the site where a piece of clay was hardened through exposure to fire, perhaps an earth oven or hearth.

Chipped Stone Tools

The first chipped stone tool in the April 2010 surface collections is an Alba point made from a non-local grayish-brown chert (Figure 8). This point has a parallel stem and a flat base, is bifacially chipped, and reworked on the tip (probably after it was broken during its first use after knapping). It is 20.1 mm in length, 15.0 mm in width, 2.9 mm in thickness, and it has a stem width of 4.3 mm. Alba points are generally considered Formative to Early Caddo period (ca. A.D. 800-1200) arrow points, although because they are diagnostic of the Alto phase (Story 2000), they may date from as long a period of manufacture and use as ca. A.D. 850-1300. They are particularly well-represented at the George C. Davis site on the Neches River (Newell and Krieger 1949:161 and Figure 56a-h), where they are considered the only "resident type." In the TARL collections from Pace McDonald, 55% of the arrow points are of the Alba type (see Table 6).

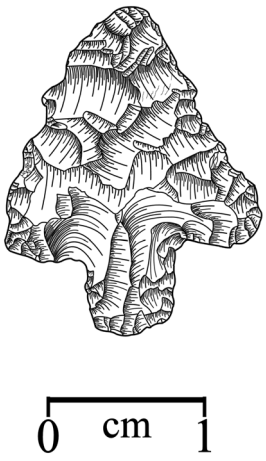


Figure 8. Alba point from the April 2010 surface collection at the Pace McDonald site.

The second chipped stone tool is a graver/unilateral retouched flake. It is made from a non-local gray chert.

Lithic Debris

The lithic debris recovered from the Pace McDonald site in the April 2010 surface collection (n=42) are predominantly pieces of non-local cherts that are apparently from the Edwards Plateau region of Central Texas, or from Brazos River and Trinity River stream gravels (Table 17); 83% of the lithic debris are made from these materials. The one piece of white novaculite lithic debris is from a southeastern Oklahoma Ouachita Mountains source or a Red River gravel source. The Caddo knappers that lived at the site clearly had a broad range of lithic raw materials to draw upon, including ready access to non-local chert, Ouachita Mountains chert, and local (14%) chalcedony, earth-colored cherts, and quartzite. Other local lithic raw materials noted in the Pace McDonald lithic debris includes petrified wood and hematite (see Table 10).

Table 17. Lithic debris from the April 2010 surface collection at the Pace McDonald site.

Raw Material	Cortical	Non-Cortical	N
Non-local chert			
dark gray chert	4	2	6
gray chert	7	14	21
gray chert with black inclusions	1	–	1
grayish-brown chert	–	1	1
brown-dark brown banded chert	1	–	1
black chert	–	1	1
white chert	–	2	2
white-black chert	1	1	2
white novaculite	1	–	1
Subtotal	15	21	36
Local lithic raw materials			
yellow chalcedony	1	–	1
brown chert	3	–	3
yellow chert	–	1	1
quartzite	–	1	1
Subtotal	4	2	6
Totals	19	23	42

Cortical pieces—including both stream-rolled, roughened, and with a limestone-covered cortex—comprise 45% of all the lithic debris, including 42% of the non-local cherts and 67% of the local lithic raw materials (see Table 17). The high proportion of cortical flakes suggests that these lithic raw materials were brought to the site with significant amounts of cortex remaining on them (perhaps as pebbles), and knapped on-site; less likely is the possibility that both non-local and local lithic raw materials were brought to the site as tools or near-complete tools with cortical remnants (or even as large flakes with cortical remnants).

19th Century Artifacts

The historic artifacts in the 2010 surface collection were found in an area about 100-150 m northeast of Mound No. 1 (see Figure 6). These few artifacts are domestic/kitchen and architectural in character, and include a cut nail (1820-1891, see Wells 2000), a plain ironstone body sherd (post-1850s), a ca. post-1870s (see Greer 1981) stoneware base sherd with a clear exterior glaze, and a blue flown blue body sherd. Flown blue vessels became popular in the United States in the 1840s-1850s (Samford 2000:79). Overall, the few historic artifacts from the Pace McDonald site suggest there may have been a mid- to late 19th century settlement/farmstead on one part of the April 2010 surface collection area.

Animal Bone

Five small pieces of poorly preserved burned animal bone were recovered in the 2010 surface collections. They may be refuse from prehistoric Caddo midden deposits or other areas of concentrated trash disposal at the site.

SUMMARY OF THE APRIL 2010 SURFACE COLLECTION FINDINGS

In April 2010, we were able to conduct a surface collection after a recent disking over a substantial portion of the known extent of the Pace McDonald site, a prehistoric Caddo mound center in the upper Neches River basin that may have been occupied from ca. A.D. 1100-1400. During the course of the surface collection, one substantial artifact concentration was identified in an area just north of Mound No. 1, the larger of the two known mounds at the site. This area contained numerous Caddo ceramic vessel sherds, and much lesser amounts of chipped stone tools, lithic debris, burned clay, animal bone, and mid- to late 19th century ceramics and a cut nail. In this same area are three small and low rises that may be additional earthen mounds (see Figure 6); they have yet to be examined through shovel testing, coring, or any kind of excavations to determine if they are in fact deliberately constructed mound features.

The eastern part of the Pace McDonald site (in the general vicinity of Mound No. 2) appears to have a very low density of prehistoric Caddo artifacts, as was previously noted by Thurmond (1978). This area of the mound center may not have been a locale for domestic habitation during the Early to Middle Caddo period occupation.

The surface collection-recovered artifacts from the site are very much the same in character and relative proportions as the larger sample of artifacts from the Pace McDonald site in the TARL collections (from both mound excavations and disparate surface collections). This indicates that the construction and use of the mounds was contemporaneous with the occupation of non-mound habitation areas.

The ceramic vessel sherds in the 2010 surface collection are predominantly grog-tempered, and plain ware vessels are particularly common (based on a P/DR ratio of 3.60 and a relatively high proportion of plain rims), and sherds from decorated utility ware vessels outnumber fine wares about 3:1. In the utility wares, decorative elements consist primarily of simple geometric patterns of incised lines and incised-punctated designs (usually featuring diagonal opposed incised lines and triangles filled with tool punctations), rows and/or zones of tool, fingernail, and circular punctations; brushed and pinched sherds are a minor aspect of the utility wares at Pace McDonald. The fine wares include engraved (i.e., geometric elements, hatched and cross-elements, mainly triangles, and carinated bowls and bottles) and red-slipped fine wares. Finally, the lithic artifacts found in the 2010 surface collection also indicate the manufacture and use of chipped stone tools made from non-local cherts.

December 2010 and later Surface Collections, Shovel Testing, and 1 x 1 m Excavation Units

SURFACE COLLECTION FINDINGS ON THE ADKIN PROPERTY

Again, a knock on a door in May 2011 resulted in our obtaining permission from Mike and Laura Adkin to conduct an archeological survey on their property, which is located south of CR 334 (Figures 9 and 10). Mr. Adkin had recently disked up portions of their property in an effort to establish Coastal Bermuda pasture. Recent rains had packed the soils and surface conditions were excellent for surface collecting. What we are calling the Adkins West area (Figure 9) is across CR 334 and just east of Mound No. 1. A light scatter of prehistoric artifacts was noted in this area. Separated by a small drain and pond is the surface collection area designated as Adkins East. This area is south of CR 334 and across the road from Mound No. 2, located on the Sanford property. Adkins East covers a large area of the disked field and appears to extend east into the area occupied by Mr. Adkin's house and yard, which is located across CR 334 from Mound No. 2. There are areas in the Adkins East portion that have high artifact concentrations (predominately sherds) and also charcoal-stained soils with flecks of animal bone; these may represent midden areas. Hopefully, our future plans for remote sensing coupled with shovel tests and hand excavations will give us a better understanding of the prehistoric use of this area at the Pace McDonald site (Perttula et al. 2011).

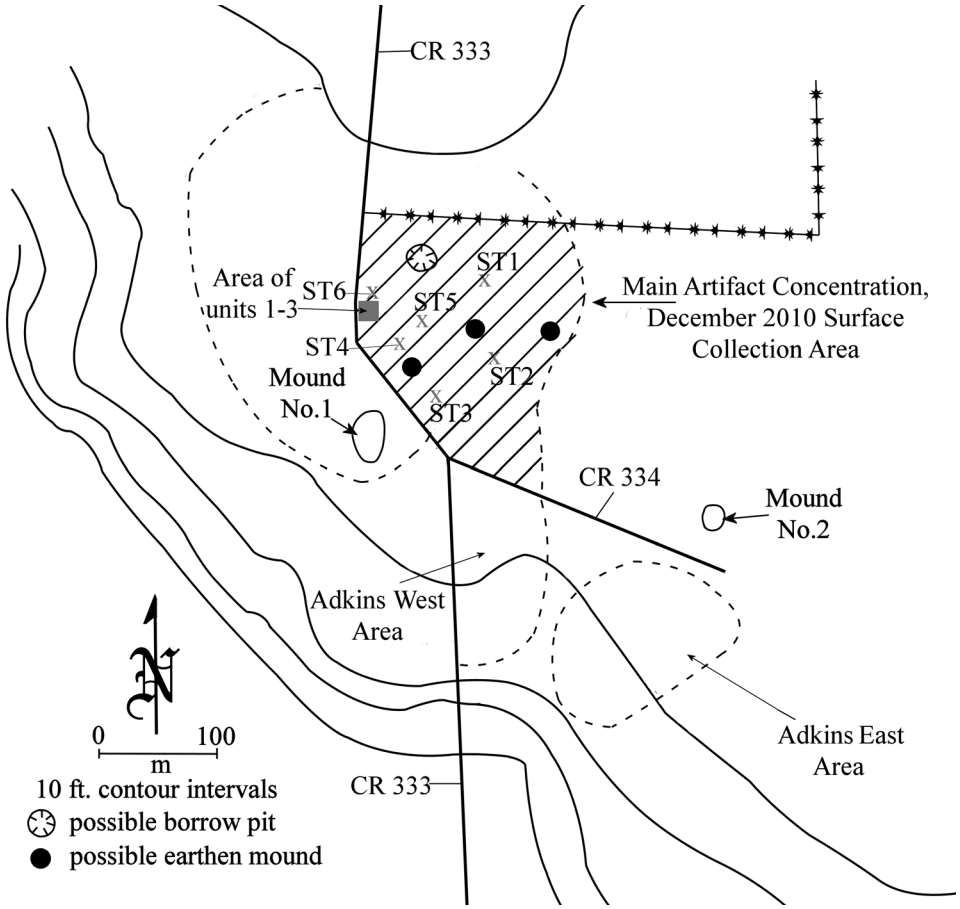


Figure 9. Visible features and artifact concentrations at the Pace McDonald site, May 2011.

Figure 10. Adkins West in foreground with Adkins East in background, May 2011.

Shovel Tests

Based on the information gained from the initial surface collections earlier in 2010 (see above), Bo Nelson and Mark Walters returned to the Pace McDonald site in December 2010 and placed six shovel tests in the area identified as having a heavier concentration of surface artifacts (see Figure 9). Granted, six shovel tests can hardly do justice to the investigation of a site the magnitude of Pace McDonald but they ended up providing some insight into the soil characteristics of the site, and in the instance of ST 6, demonstrated that there are intact and significant archeological features preserved at the site. Shovel tests (ST) were 35 cm in diameter and they were excavated in 20 cm arbitrary levels until a clay B-horizon was encountered. The matrix was dry-screened through ¼-inch hardware cloth for the recovery of artifacts. Standard shovel test forms were used for describing the texture and color of the soils, artifacts that were collected and their depths, the location of the STs as determined by UTM coordinates, as well as other pertinent data. Soils were described according to descriptions in the *Soil Survey of Anderson County, Texas* (Coffee 1975). Soil colors were obtained with a Munsell soil color chart.

All six of the shovel tests contained archeological material culture remains, and assorted other remains (see Figure 9). ST 1 was placed on a small rise that had a surface concentration of artifacts. There had also been recent feral hog activity at this location. From 0-22 cm bs was a yellowish-red (5YR5/6) sandy loam with 100+ pebble-sized iron ore or ferruginous sandstone and hematite gravels; 22-40 cm bs was a yellowish-red (5YR4/6) sandy loam with 100+ pebble-sized iron ore gravel and 10+ manganese concretions. From 40-50 cm bs a dark red (2.5YR3/6) sandy clay B-horizon was encountered. From 0-20 cm bs, eight ceramic sherds were collected, while only one piece of charred plant remains came from 20-40 cm bs. From 40-50 cm bs, one ceramic sherd was collected.

ST 2 was placed some 75 m south of ST 1 (see Figure 9). Only lithic materials were noted on the surface around ST 2. The soil descriptions for the shovel test were: 0-40 cm bs, yellowish-red sandy loam

with no gravel; and 40-50 cm bs was a dark red sandy clay B-horizon. From 0-20 cm bs one lithic artifact was recovered, and the 20-40 cm bs level also yielded one flake.

ST 3 was placed southwest of ST 2 (see Figure 9). Soil descriptions were: 0-18 cm bs, yellowish-red sandy loam; 18-34 cm bs, yellowish-red sandy loam; and from 34-36 cm bs was a dark-red sandy clay B-horizon. No gravel was present in any of the sediments. The 0-20 cm bs level yielded one lithic flake; 20-36 cm bs deposits contained two ceramic sherds, one lithic flake, and one piece of charred plant remains.

ST 4 was located NW of ST 3 and 10 m east of CR 333 (see Figure 9). Soil descriptions for the shovel tests were as follows: 0-20 cm bs, yellowish-red sandy loam and 20-55 cm bs, yellowish-red sandy loam. There were 250+ pebble-sized iron ore gravels plus 20 manganese concretions in the lower E-horizon sandy loam sediments. From 55-60 cm bs was a dark-red sandy clay B-horizon. The 0-20 cm bs level contained nine ceramic sherds and two lithic flakes, while the 20-40 cm bs level had five ceramic sherds and two lithic flakes.

ST 5 was located some 30 m northeast of ST 4 (see Figure 9). Its soil description was: 0-28 cm bs, yellowish-red sandy loam with 100+ pebble-sized iron ore gravels; 28-46 cm bs, yellowish-red sandy loam with charcoal flecks and 100+ gravels and 10+ manganese concretions. The B-horizon was reached at 46-55 cm bs, and it was a dark red sandy clay. The 0-20 cm bs level had five ceramic sherds and one lithic flake, while the 20-40 cm bs level had one ceramic sherd; the sandy loam sediments between 40-46 cm bs yielded five ceramic sherds.

ST 6 was located northwest of ST 5 and 5 m east of CR 333 (see Figure 9). From 0-24 cm bs was a yellowish-red sandy loam with 500+ pebble-sized iron ore gravels, and the sediments from 24-42 cm bs were a yellowish-red sandy loam with 500+ gravel pieces. The sediments between 42-78 cm bs were a very dark grayish-brown (10YR 3/2) sandy loam midden deposit with charcoal and bone pieces and 500+ pieces of gravel and 100+ manganese concretions. Below the midden, from 78-105 cm bs, was yellowish-brown (10YR 5/6) sandy loam with gravel and manganese concretions. Artifacts collected in this shovel test were: 0-20 cm bs, seven ceramic sherds; 20-40 cm bs, five ceramic sherds; 40-60 cm bs, 10 ceramic sherds, three lithic flakes, and 46 animal bone fragments; 60-80 cm bs, nine ceramic sherds, one animal bone fragment, and one charred plant remain; and 80-105 cm bs, two ceramic sherds and two animal bone fragments.

The archeological findings from ST 6 were certainly different than what was identified in the other STs in this part of the Pace McDonald site. The ST 6 findings indicated that a buried archeological midden deposit with well-preserved plant and animal remains and abundant material culture remains was present in an area not far north of Mound No. 1 (see Figure 9).

Results of 1 x 1 m Unit Excavations

In January 2011, based on the archeological results of ST 6, a 1 x 1 m hand-excavated unit was placed adjacent to ST 6 (Figure 11). Unit 1 was excavated to 80 cm bs in arbitrary 10 cm levels. A standard excavation form was used to record soil descriptions, the provenience and depth of artifacts, possible cultural stains, and features. A profile was made of one wall that best described soil conditions and the apparent cultural stratigraphy (Figure 12). All sediments were dry-screened through ¼-inch hardware cloth to recover artifacts from controlled contexts in the unit. Artifacts collected from the screen were bagged and labeled, then later washed, dried, and re-bagged for analysis.

Zone 1 (see Figure 12) in Unit 1 is interpreted as a plow zone with a yellowish-red (5YR 4/6) sandy loam soil with many ferruginous sandstone pebbles. Sherds in this zone were sparse in number and small in size. There was a subtle change in soil color that distinguished Zone 1 from Zone 2.

Zone 2 was a yellowish-red (2.5YR 4/6) sandy loam with 500+ pebbles and manganese concretions. Again, sherds were sparse in number and small in size.

Figure 11. Unit 1 with probable borrow pit (marked by a darker color) in background.

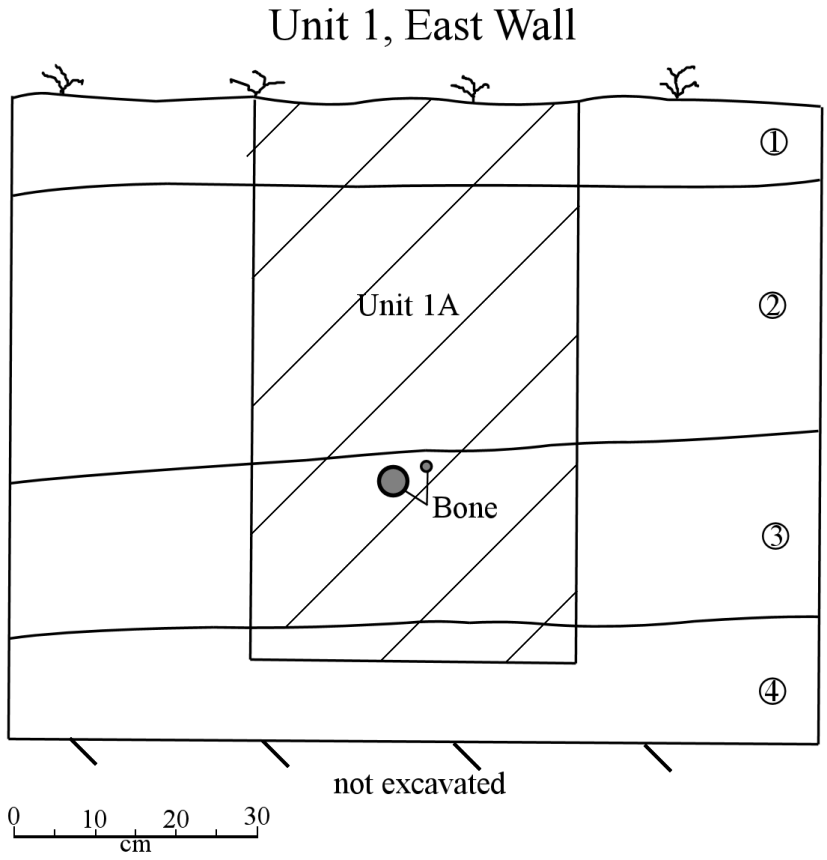


Figure 12. East profile of Unit 1.

There was a very abrupt change in soil color, artifact size, and artifact density at 45 cm bs, at the top of Zone 3 (see Figure 12). The sediments became a very dark grayish-brown (10YR 3/2) with bone, charcoal, and abundant artifacts, particularly ceramic sherds. Zone 3 is a buried midden deposit, the same deposits identified in ST 6 between 42-78 cm bs. In Unit 1, the Zone 3 midden soils extended to 65 cm bs, with some organic staining extending into the upper part of Zone 4.

There was a gradual change from Zone 3 to Zone 4, with the sediments becoming a dark yellowish-brown (10YR 4/6) sandy loam. Artifact counts dropped sharply below 65 cm bs, with gravel and manganese concretions increasing to 2500+ in number per level.

At present, we are unable to definitely explain the origins of Zones 1 and 2. The soils are very similar between the two, except that Zone 1 has been plowed in modern times, and the ceramic artifacts recovered are equally small in both zones. Zone 1 and 2 sediments likely represents an intentional fill deposit intended to bury the Zone 3 midden, and in fact they may well represent a small mound built over the midden; another possibility is that they represent a fill episode to level a low spot where substantial midden deposits had previously accumulated, but we will have to wait on future work to be more conclusive.

Unit 1 was terminated at 80 cm bs due to time constraints and the fact that the artifact count had diminished considerably. What artifacts, as well as patches of darker sediments, that were recovered in Zone 4 were probably the product of bioturbation and soil leaching. A 20 x 20 cm test hole was placed in the center of Unit 1 to gather information about the sediments below the midden deposit. The sediments were not screened. The Zone 4 sediments continued from 80-110 cm bs, with increasing amounts of gravel and manganese concretions. From 110-115 cm bs, a reddish-yellow (7.5YR 6/8) clay loam was reached. We learned from the other shovel tests in the general area of Unit 1 that the Bt horizon was reached between 36-55 cm bs. ST 5, the next closest shovel test to ST 6 and Unit 1, had clay at 46 cm bs. Why was the clay horizon so deep in Unit 1 and ST 6 compared to ST 1-5? One reason may be that the additional 35-40 cm of sediments represented by Zones 1 and 2 in Unit 1 appear to have been added after the midden was deposited, which would have increased the depth from the surface to the Bt horizon. Also, the midden soils in Zone 3 were probably thickened by deposits of organics and other materials.

After completing work on Unit 1, a 40 x 40 cm unit designated Unit 1A was placed immediately to the east of Unit 1 in order to collect samples of artifacts, plant remains, and faunal remains for fine screen and flotation (Figure 13). Levels 1-4 of Unit 1A were dry-screened through ¼-inch mesh for artifact recovery. When the midden was encountered beginning at 40 cm bs, a 22.7 liter sample for flotation was taken from each 10 cm level to the depth of 70 cm bs.

In April 2011, Bo Nelson and Mark Walters were able to return to the Pace McDonald site and placed two additional 1 x 1 m units adjacent to the west of Unit 1 (see Figure 9). Sediments in Units 2-3 were basically the same as described above by zone for Unit 1 (Figure 14-15), although the midden (Zone 3) seemed to have a lower artifact density moving from east to west, as least as far as the number of artifacts that were recovered in the excavations. It may be that the more intense portion of the midden is centered more to the east of Unit 1 (see Figure 9). A 22.7 liter sample for fine screen and flotation was taken from each level (5-7) of Units 2-3 that represented the midden zone (Zone 3).

ARTIFACT ASSEMBLAGE, DECEMBER 2010-APRIL 2011 INVESTIGATIONS

Ceramic Vessel Sherds

A total of 1965 ceramic vessel sherds have been recovered in the latest investigations at the Pace McDonald site, about 65% from the three 1 x 1 m units in a midden deposit, well north of Mound No. 1, 16% from the December 2010 surface collection and 4% from shovel tests in this same area, 14% from the Adkin East surface collection, south and southwest of Mound No. 2, and 1.4% from the Adkin West surface collection southeast of Mound No. 1 (Table 18).

Figure 13. Unit 1A in east end of Unit 1.

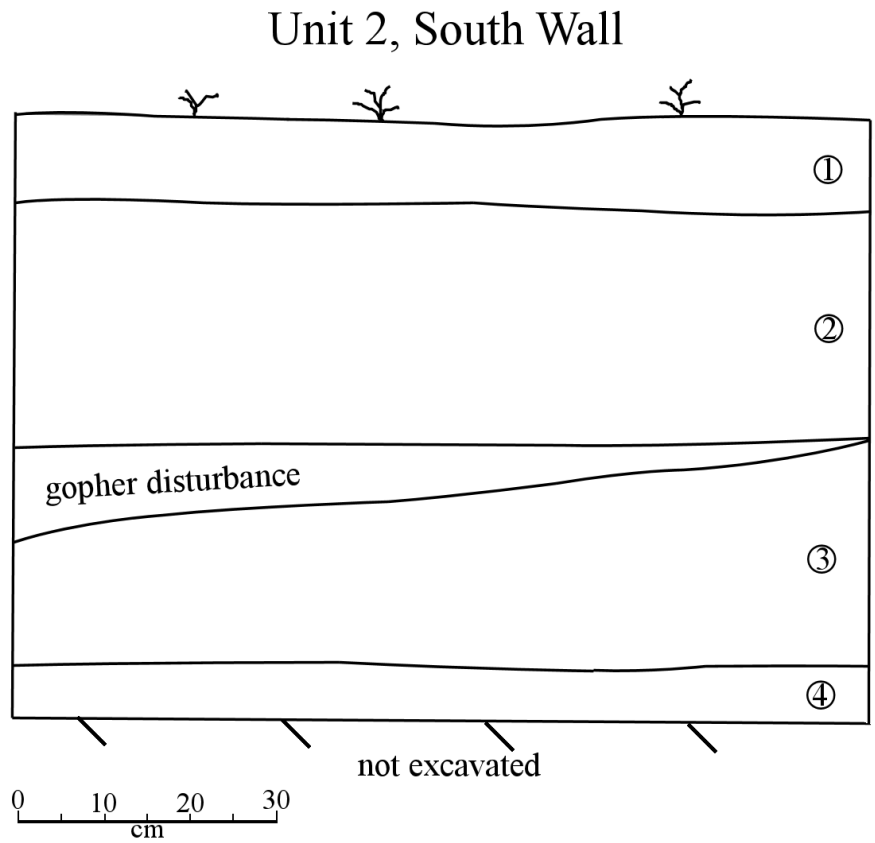


Figure 14. South profile of Unit 2.

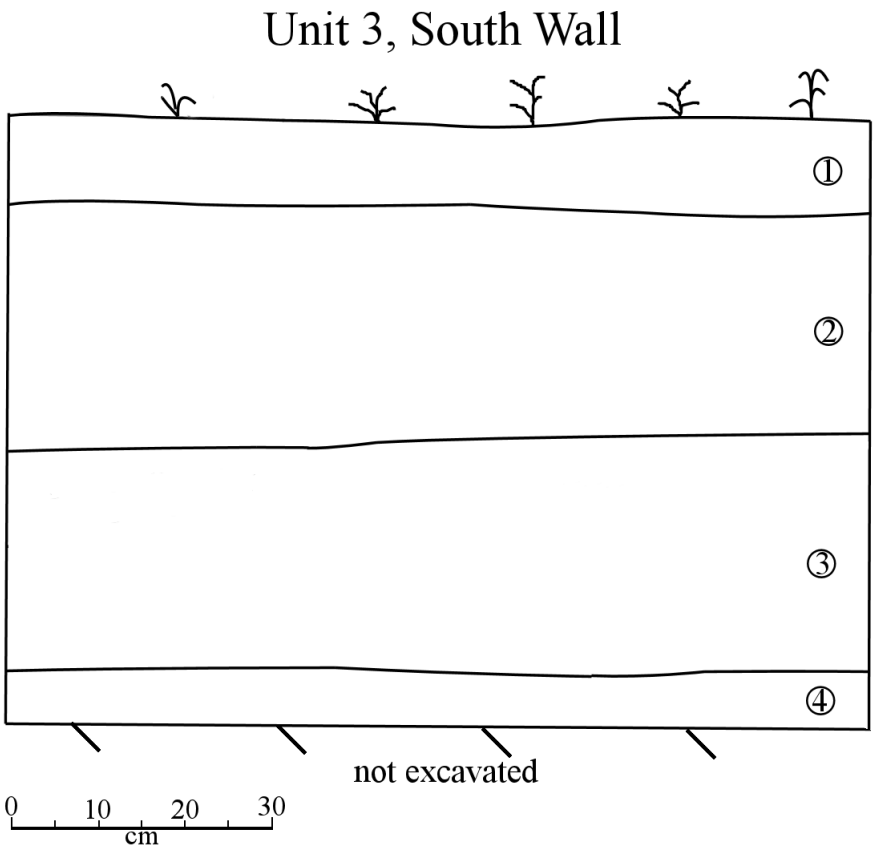


Figure 15. South profile of Unit 3.

Table 18. Summary of Ceramic Vessel Sherds from December 2010-2011 Archeological Investigations at the Pace McDonald Site.

Provenience	Decorated Sherds	Plain Sherds	N
December 2010 surface collection	71	242	313
Adkin East surface collection	38	234	272
Adkin West surface collection	9	23	32
Shovel Tests 1-6	12	60	72
Unit 1	114	437	547
Unit 2	71	284	355
Unit 3	70	300	370
Totals	385	1580	1965

In the shovel testing, the highest densities of sherds were recovered in ST 4-6 in the western part of the December 2010 surface collection area, north of Mound No. 1 (see Figure 9). The densities of sherds ranged from 9-30 sherds per shovel test, or ca. 72-240 sherds per m^2, with the highest density in ST 6. Densities of sherds in the 1 x 1 m units ranged from 353-511 sherds per m^2, with the highest density in Unit 1.

By depth in the hand excavations, the highest frequency of sherds occurred between 40-60 cm bs (n=95-157 sherds per level) in Unit 1, 20-50 cm bs in Unit 2 (64-67 sherds per level), and 20-50 cm bs in Unit 3 (71-93 sherds per level). These levels are in shallowly buried midden deposits.

Approximately 20% of the sherds from these different parts of the site are decorated, which translates into a P/DR of 4.10. The highest percentages of decorated sherds (23-28%) are in the December 2010 surface collection area northeast of Mound No. 1 and the Adkins West surface collection, east of Mound No. 1. In Units 1-3, the percentage of decorated sherds ranges only from 19-21%; these units have P/DR values that range from 3.83-4.29 (see Table 18).

The plain sherds include 42 rims (Figure 16), 85 bases—including the lower portion of a foot to a pedestal base (Figure 17)—and 1453 body sherds (Table 19). Rims represent almost 3% of the plain sherds, suggesting that plain ware vessels are relatively abundant in the Pace McDonald ceramic assemblage. In fact, the plain rims account for 50% of the 84 rim sherds in these ceramic collections, compared to 16% fine wire rims and 34% utility ware rims (see below).

Figure 16. Plain rims from the 1 x 1 m unit excavations. Provenience: a, Unit 1, 50-60 cm bs; b, Unit 3, 10-20 cm bs.

About 72% of the decorated sherds from the latest round of investigations at the Pace McDonald site are from utility ware vessels, primarily jars. The remainder of the decorated sherds are from fine ware engraved and red-slipped vessels (Table 20). Most of the decorated sherds were recovered in the 1 x 1 m units and the December 2010 surface collection area, both north of Mound No. 1.

About 42% of the fine ware sherds (and 31% of the fine ware rim sherds) are from vessels that have a red slip on one or both surfaces (Table 21). These sherds are from bottles, bowls, and carinated bowls that are decorated only with a red slip. The one exception is a red-slipped sherd from a Maxey Noded Redware bottle that has several straight appliqued ridges on the upper vessel body (see Suhm and Jelks 1962:Plate 51f).

The other fine wares are sherds from engraved vessels, including bowls, carinated bowls, and bottles; a few of the sherds have a red pigment rubbed in the engraved lines (Figure 18e). Among the rims,

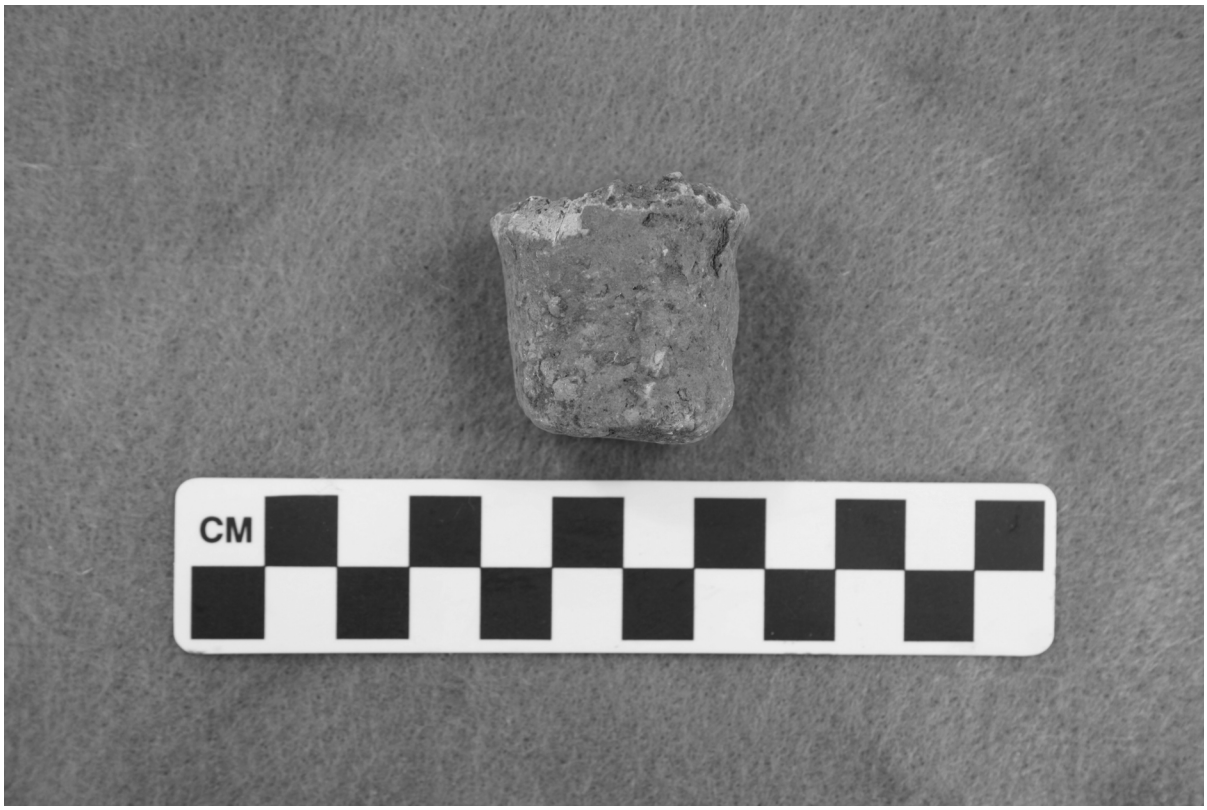


Figure 17. Plain foot to a pedestal-based vessel. Provenience: Unit 1, 50-60 cm.

Table 19. Plain Sherds from the December 2010-present investigations at the Pace McDonald site.

Provenience	Rim	Body	Base	N
December 2010 surface collection	3	223	16	242
Adkins East surface collection	4	220	10	234
Adkins West surface collection	1	22	–	23
Shovel Tests 1-6	3	56	1	60
Unit 1	18	394	25*	437
Unit 2	8	259	17	284
Unit 3	5	279	16	300
Totals	42	1453	85	1580

*includes a foot from a pedestal base

principal elements include horizontal (Figure 18a), horizontal and diagonal, vertical, diagonal (Figure 18g), cross-hatched, and curvilinear (Figure 18b) engraved lines; the simple straight and geometric elements are predominant among the nine rims (89%), as they are among the body sherds (75% of the 56 body sherds) (Figure 18e). Hatched engraved zones are also present in the fine wares (Figure 18c). Bottle sherds tend to have curvilinear engraved lines and curvilinear hatched zones; one sherd has large excised pendant triangles (Figure 18f) and another bottle sherd has a chevron motif (Figure 18d).

Table 20. Summary of Decorated Sherds from the December 2010-present investigations at the Pace McDonald site.

Decorative method	12/10 SC	ST	1 x 1	Adkins E SC	Adkins W SC	N
Engraved	5	3	42	13	1	64
Engraved-red-slipped	1	–	1	–	–	2
Red-slipped	10	2	28	4	–	44
Red-slipped-appliqued	–	–	1	–	–	1
Sub-total, fine ware	16	5	72	17	1	111
Incised	20	5	71	9	4	109
Tool punctated	22	2	55	8	1	88
Linear punctated	–	–	4	–	–	4
Fingernail punctated	3	–	19	2	–	24
Circular punctated	2	–	5	–	–	7
Crescent punctated	1	–	–	–	–	1
Pinched	1	–	7	–	–	8
Incised-punctated	5	–	13	2	3	23
Appliqued	–	–	2	–	–	2
Brushed	1	–	5	–	–	6
Brushed-incised	–	–	1	–	–	1
Brushed-incised-punctated	–	–	1	–	–	1
Sub-total, utility ware	55	7	183	21	8	274
Totals	71	12	255	38	9	385

One body sherd is from a Holly Fine Engraved vessel with diagonal engraved lines adjacent to a large excised triangle. This is the sole Holly Fine Engraved sherds found in any of the Pace McDonald ceramic collections.

The utility ware sherds recovered in the latest round of surface collections, as well as the shovel tests and 1 x 1 m units north of Mound No. 1, are dominated by sherds from vessels with punctated (45%) and incised (40%) decorations. Also common are incised-punctated sherds (Table 22). Much less common are sherds from vessels with pinched (2.9%), brushed (2.5%), appliqued (0.7%), brushed-incised (0.4%), and brushed-incised-punctated (0.4%) decorations. Only 3.3% of the utility wares have brushed marks on vessel bodies. With respect to the rim sherds, almost 66% are from incised vessels, compared to 17.2% from punctated vessels, 13.8% from incised-punctated vessels, and 3.4% from pinched vessels.

The incised decorative elements in this assemblage from the Pace McDonald site are overwhelmingly based on straight line and simple geometric elements (98% of the incised sherds). Only 2% have either curvilinear or circular elements (see Table 22), and one of these sherds is a rim. The principal decorative elements consist of diagonal incised lines pitched either from the left to the right (Figures 19 and 20a) or pitched from the right to the left. About 68% of the incised rims have diagonal lines; one of these has a

Table 21. Decorative elements in the fine ware sherds, December 2010-present investigations at the Pace McDonald site.

Decorative methods and elements	Rim	Body	N
Chevrons, multiple engraved lines	–	1*	1
Circle engraved element	–	1	1
Circle and arcing engraved lines	–	1	1
Cross-hatched engraved lines	1	1	2
Curvilinear engraved lines	1	7*	8
Curvilinear and opposed engraved lines	–	1	1
Curvilinear engraved lines and circular hatched zone	–	1	1
Curvilinear hatched zones	–	1	1
Curvilinear hatched zone	–	1*	1
Diagonal engraved lines	2	1	3
Diagonal engraved lines and excised triangle	–	1	1
Hatched engraved zones	–	3	3
Horizontal engraved lines	2	2*	4
Horizontal and diagonal engraved lines	2+	–	2
Opposed engraved lines	–	11*	11
Parallel engraved lines	–	8	8
Straight engraved line	–	14	14
Straight engraved line and excised pendant triangle	–	1*	1
Vertical engraved lines	1	–	1
Sub-total, Engraved	9	56	65
Red-slipped, int. and ext. surfaces	2	15	17
Red-slipped, ext. surface	2	26*	28
Red-slipped, int. surface	–	1	1
Red-slipped, ext. surface and appliqued ridges	–	1*	1
Sub-total, red-slipped	4	43	47
Totals	13	99	112

*includes bottle sherds; +=incised line on sherd lip

collared rim. Other rims have cross-hatched incised lines, diagonal opposed incised lines, or horizontal-diagonal incised lines (see Table 22). All of these rims are likely from Maydelle Incised jars.

Among the body sherds, there are several common incised decorative elements. These include cross-hatched lines, opposed incised lines (see Figure 20b), and parallel incised lines.

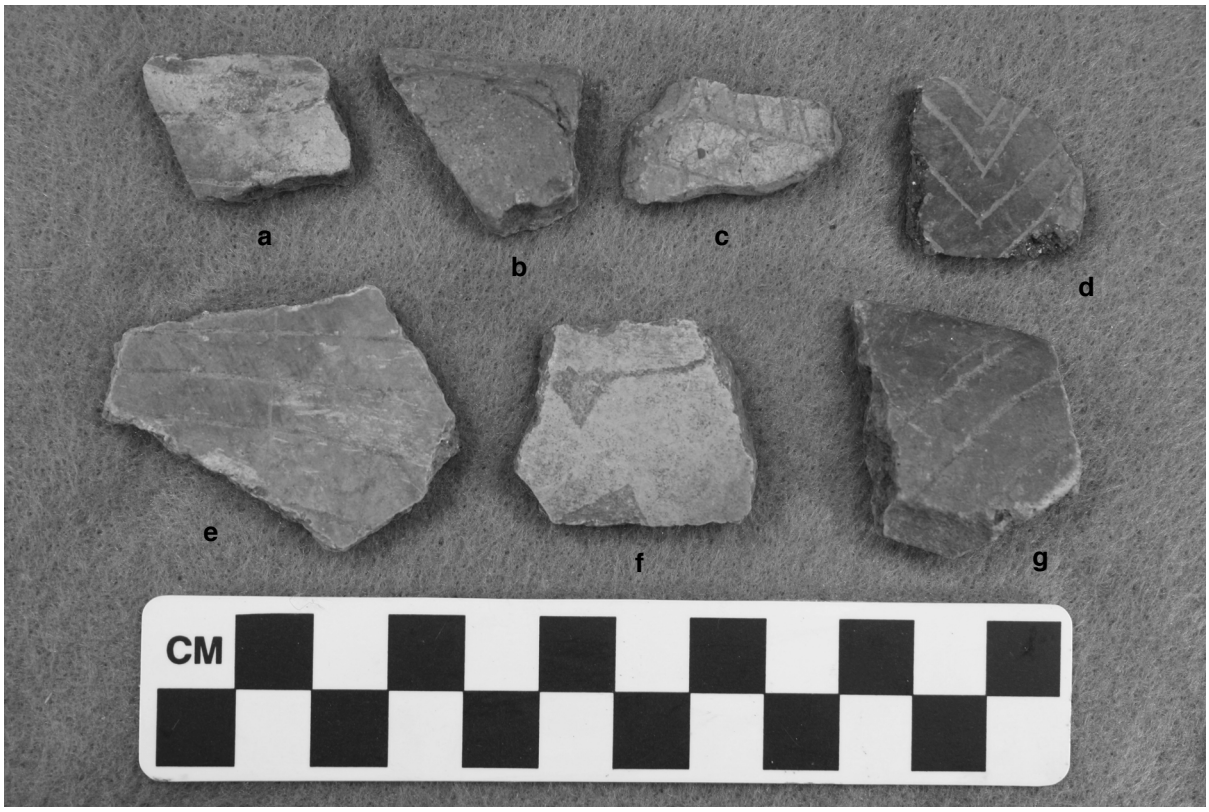


Figure 18. Engraved sherds from the December 2010-present archaeological investigations at the Pace McDonald site. Provenience: a-b, f, Unit 1, 40-50 cm bs; c, Unit 3, 20-30 cm bs; d-e, Unit 3, 60-70 cm bs; g, Unit 1, 50-60 cm bs.

Incised-punctated sherds comprise 8.4% of all the utility ware sherds and 13.8% of the utility ware rims. More than 73% of these sherds have a tool punctated decorative element, with lesser amounts decorated with large circular punctations (13%), fingernail punctations (9%), and cane punctations (4%).

Only two of the incised-punctated sherds, both body sherds, have circular or curvilinear incised lines with punctate-filled zones: a sherd with a circular incised zone adjacent to tool punctates, and another has curvilinear incised lines and a small circular punctated-filled zone. The remainder of the incised-punctated sherds have straight, parallel, horizontal, or diagonal incised lines on the rim, typically forming incised triangles filled with punctations (Figure 21b); they are identified as sherds from Maydelle Incised jars. These zones are filled with cane punctations (a sherd with a diagonal incised zone filled with cane punctates), tool punctations (n=8, horizontal and diagonal incised lines and tool punctated-filled incised triangle; incised triangles filled with tool punctates, and parallel incised lines adjacent to a tool punctated zone), and fingernail punctations in a zone adjacent to opposed incised lines (Figure 21d). Many of the sherds have a single straight incised line adjacent to a row or zone of punctations (Figure 21a, c); these rows or zones of punctations (circular, fingernail, and tool punctates) are probably within triangular incised elements.

The remaining incised-punctated sherds have different combinations of decorative elements. One rim sherd has a horizontal incised line above circular punctated rows on the remainder of the rim, while two body sherds have straight or parallel incised lines with tool punctates either between each line, or above and below each incised line.

The punctated sherds in these Pace McDonald ceramic collections include six different methods of punctation: tool; linear tool; fingernail; crescent-shaped; large circular; and cane. The tool punctated sherds are the most common, accounting for 71% of the punctated sherd sample, and 60% of the

Table 22. Decorative elements in the utility ware sherds, December 2010-present investigations at the Pace McDonald site.

Decorative methods and elements	Rim	Body	N
Straight appliqued ridge	–	1	1
Appliqued nodes	–	1	1
Subtotal, appliqued	–	2	2
Chevron-incised lines	–	1	1
Cross-hatched incised lines	1	17	18
Cross-hatched and diagonal incised lines	1	–	1
Curvilinear incised line	–	1	1
Diagonal incised lines	13+	2	15
Diagonal opposed incised lines	2**	1	3
Horizontal incised lines	–	1*	1
Horizontal and circular incised lines	1	–	1
Horizontal and diagonal incised lines	1	–	1
Opposed incised lines	–	10	10
Parallel incised lines	–	20	20
Parallel and diagonal incised lines	–	1	1
Straight incised line	–	36	36
Straight incised line, int. vessel surface	–	1	1
Subtotal, incised	19	91	110
Circular incised zone adjacent to tool punctates	–	1	1
Circular punctates adjacent to straight incised line or parallel incised lines	–	2	2
Curvilinear incised lines and small circular punctated-filled zone	–	1	1
Diagonal incised zone filled with cane punctates	1	–	1
Horizontal incised line above circular punctated rows	1	–	1
Horizontal and diagonal incised lines and tool punctated filled incised triangle	1	–	1
Incised triangle filled with tool punctates	1	4	5
Opposed incised lines and adjacent fingernail punctated	–	1	1
Parallel incised lines with tool punctates between each line	–	1	1
Parallel incised lines adjacent to tool punctated zone	–	1	1
Fingernail punctated zone adjacent to straight incised line	–	1	1
Tool punctates adjacent to straight incised line	–	5	5

Table 22. Decorative elements in the utility ware sherds, December 2010-present investigations at the Pace McDonald site, cont.

Decorative methods and elements	Rim	Body	N
Tool punctate below straight incised line	–	1	1
Tool punctated rows above and below straight incised line	–	1	1
Subtotal, incised-punctated	4	19	23
Cane punctated rows	–	1	1
Circular punctated rows	1	3	4
Circular punctated, free	–	1	1
Circular punctated, single punctate	–	1	1
Crescent-shaped punctated rows	–	1*	1
Fingernail punctated, free	–	3	3
Fingernail punctated rows	–	13	13
Fingernail punctated, single punctate	–	8	8
Linear tool punctated rows	–	3	3
Linear tool punctated, diagonal rows	1	–	1
Tool punctated, free	–	13	13
Tool punctated rows	3	52	55
Tool punctated, single punctate	–	20	20
Subtotal, punctated	5	119	124
Vertical pinched ridges	1	–	1
Curvilinear pinched ridge	–	1	1
Opposed pinched ridges	–	2	2
Parallel pinched ridges	–	4	4
Subtotal, pinched	1	7	8
Horizontal brushed	–	1	1
Parallel brushed	–	6	6
Subtotal, brushed	–	7	7
Parallel brushed-incised	–	1	1
Parallel brushed-incised with fingernail punctated rows through brushing	–	1	1
Totals	29	247	276

*includes a bottle sherd; **rim peak; +includes a collared rim

Figure 19. Large diagonal incised rim sherd from Unit 2, 40-50 cm bs at the Pace McDonald site.

punctated rims. The tool punctations tend to have been placed in rows (Figure 22b-f), about 80% of the time, on the rim and the vessel body, as is the case for the other methods of punctation, but free and randomly-placed tool punctations were also used on vessel bodies (Figure 22a, g).

Fingernail punctations account for 20% of the punctated sherds (see Table 22). That they are all body sherds suggests this form of decoration was limited to vessel bodies, and did not occur on jar rims. About 81% of the fingernail punctated sherds occur in rows (horizontal and vertical, Figure 23b-c), while other body sherds have randomly or freely-placed fingernail punctates.

The other punctated sherds—cane, large circular (see Figure 23a), crescent-shaped, and linear tool punctations—have rows of punctations as their principal decorative motif (91%). One of the large circular punctated sherds has randomly or freely-placed punctations (see Table 22). One of the punctated sherds among this group is a non-slipped bottle sherd with rows of small crescent-shaped punctations on what is likely the upper body of the vessel. Although it is not from a slipped bottle, the decoration is comparable to the punctated variety of Maxey Noded Redware (see Suhm and Jelks 1962:101 and Plate 51d).

The few pinched sherds (2.9% of the utility wares) are likely from Killough Pinched vessels (see Suhm and Jelks 1962:Plate 46). At Pace McDonald, the sherds have straight, opposed, vertical, and curvilinear ridges that were spaced so as to have covered the vessel body (Figure 24a-b).

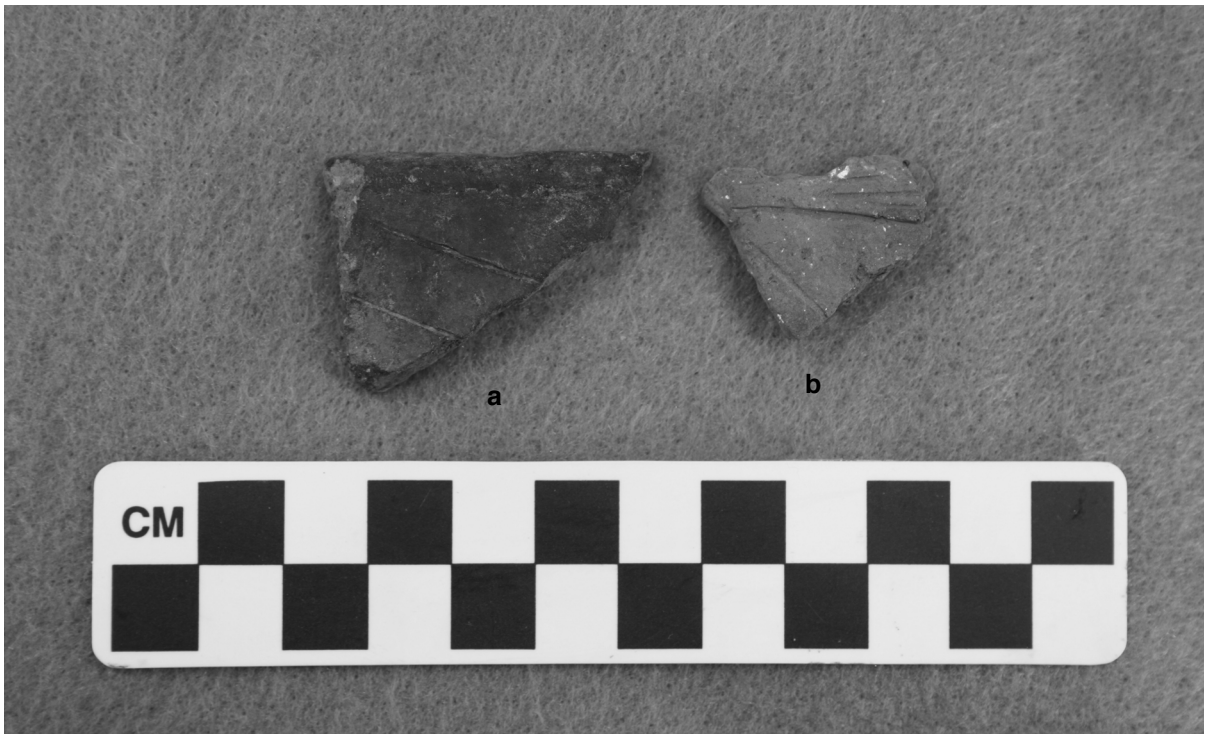


Figure 20. Other incised sherds from the Pace McDonald site. Provenience: a, Unit 2, 60-70 cm bs; b, Unit 1, 40-50 cm bs.

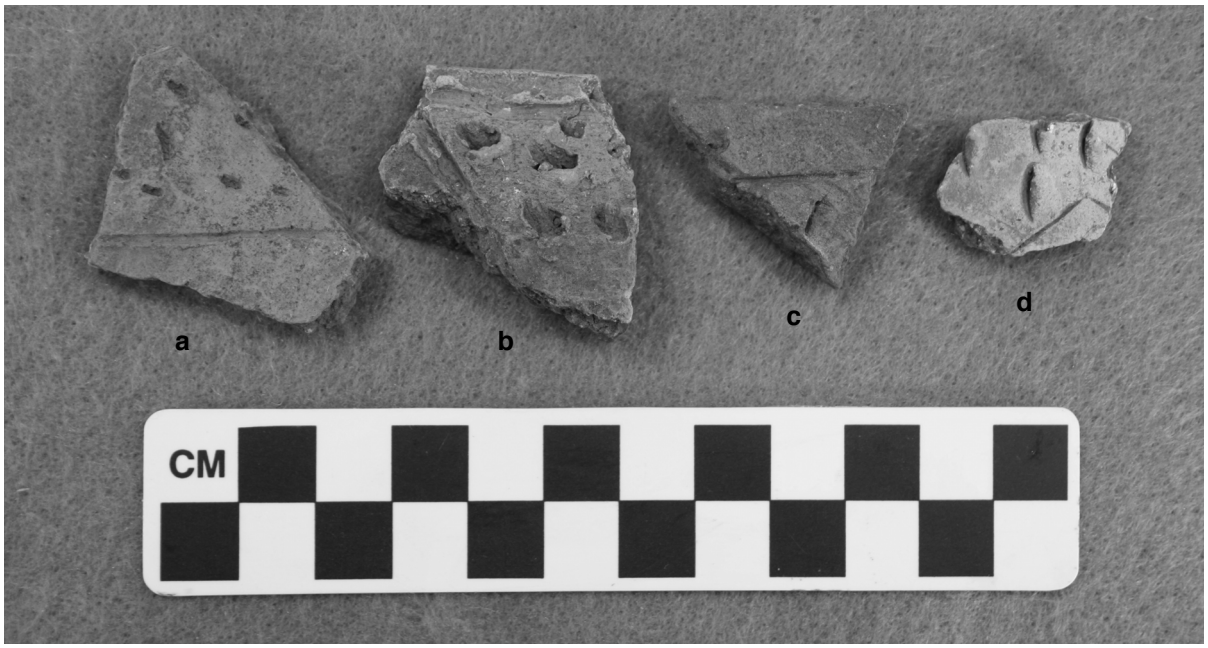


Figure 21. Incised-punctated sherds at the Pace McDonald site. Provenience: a, Unit 2, 30-40 cm bs; b, Unit 3, 40-60 cm bs; c, Unit 1, 50-60 cm bs; d, Unit 1, 40-50 cm bs.

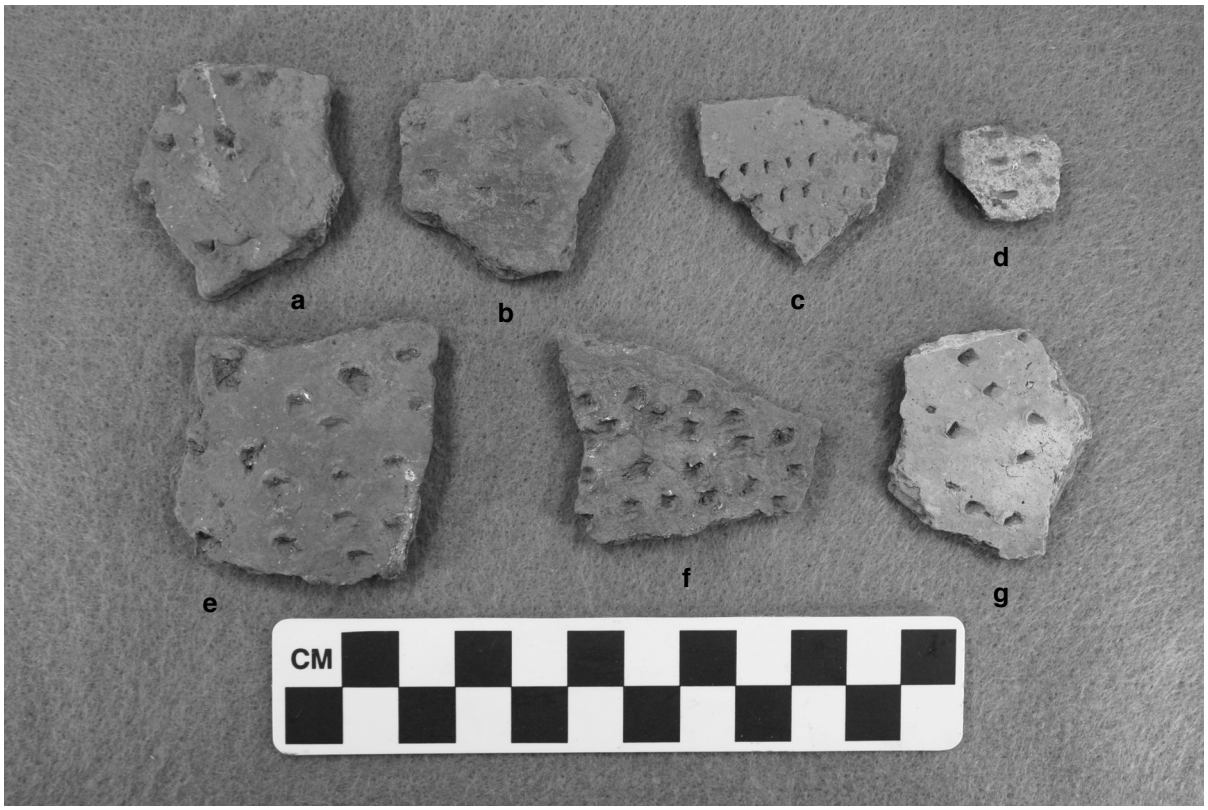


Figure 22. Tool punctated sherds from the Pace McDonald site. Provenience: a-c, Unit 1, 70-80 cm bs; d, Surface near Unit 1; e-f, Unit 1, 50-60 cm bs; g, Unit 1, 40-50 cm bs.

Other utility ware vessels have straight appliqued ridges and small appliqued nodes (see Table 22). The one body sherd with fingernail punctated rows pushed through parallel brushed-incised lines may be from a Bullard Brushed jar.

A sample of sherds (n=81) from Unit 1 were also analyzed in more detail for technological attributes. This was done specifically to obtain information on the (1) temper-paste groups represented in the sherds, and (2) determine the firing conditions represented in the sherds.

Almost 99% of the sherds analyzed in more detail have a clayey or silty paste. One sherd (1.2%) has a sandy paste, probably from use of a naturally sandy clay for ceramic vessel manufacture. All but one sherd has grog temper, either as the sole temper inclusion (77%), or in combination with burned bone (14%), hematite (5%), or charred organics (4%). One sherd (1.2%) has burned bone as the sole temper.

The detailed analysis sherds are from vessels that were predominantly fired in a reducing or low oxygen environment (75%), but the majority of the reduced fired sherds (89%) were subsequently cooled in the open air, leaving a thin oxidized core lens and a lighter surface color on either one or both vessel surfaces (see Teltser 1993:Figure 2f-h). About 11% of the reduced fired sherds were fired and cooled in a low oxygen environment, leaving a dark core and dark-colored vessel surfaces (see Teltser 1993:Figure 2b). A small number of sherds (11%) are from vessels that were fired and cooled in an high oxygen or oxidizing environment (see Teltser 1993:Figure 2a), while another 9% were from vessels that were incompletely oxidized during firing. Another 5% have evidence of sooting, smudging, or refiring (see Perttula 2005:Figure 5-30k).

Figure 23. Fingernail and circular punctated sherds from the Pace McDonald site. Provenience: a, Unit 3, 40-50 cm bs; b, Unit 2, 40-50 cm bs; c, Unit 2, 30-40 cm bs.

Ceramic Pipe Sherds

The pipe sherds include several from long-stemmed Red River pipes. In Unit 1, 20-30 cm, is a stem sherd that is 2.6 mm in thickness; also in Unit 1 (30-40 cm bs) are single bowl (2.5 mm thick) and stem (3.4 mm) sherds. A long-stemmed bowl sherd (2.4 mm in thickness) was found in Unit 2, 10-20 cm bs, and another (2.8 mm thick) came from Unit 3, 20-30 cm bs. The largest pipe sherd, from Unit 1, 40-50 cm (from the fine-screen sample), includes part of a long-stemmed pipe stem and the lower bowl where it joins with the stem (Figure 25); it is bone-tempered. The exterior stem diameter is 12.7 mm, while the stem diameter hole is 7.1 mm; both thickness measurements are consistent with this sherd being from a Middle Caddo period *var. Haley* Red River long-stemmed pipe (see Hoffman 1967).

Possible Clay Ear Spool or Clay Plug

A possible clay ear spool or clay plug fragment was found in the midden deposits (40-50 cm bs) in Unit 3. It is 17.9 mm in diameter, and 19.6 mm in length. The piece is circular at one end that is attached to a stem that is 10.0 mm in diameter and 15.8 mm in length.

Daub

Only a few pieces of daub have been found at the site, suggesting either that any Caddo structures there were not clay and thatch-covered, and/or that if there were clay and thatch-covered structures, no such structures burned down, thus not preserving the impressed clay through exposure to fire. Daub pieces have been found in Unit 1, 30-40 cm bs (n=1), Unit 1, 40-50 cm bs (n=1), Unit 2, 30-40 cm bs (n=1), Unit 2, 40-50 cm (n=1), and Unit 3 (n=2, 30-40 cm bs and 60-70 cm bs).

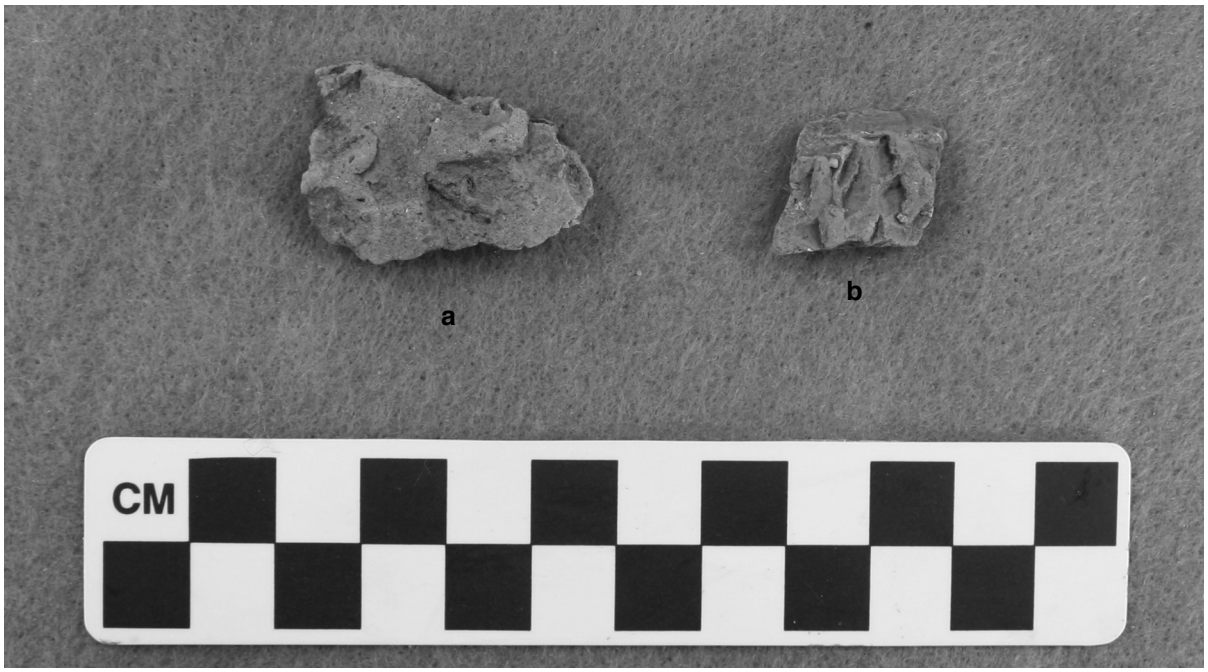


Figure 24. Pinched body sherds from the Pace McDonald site. Provenience: a, Unit 2, 60-70 cm bs; b, Unit 1, 40-50 cm bs.

Figure 25. Long-stemmed pipe stem and lower bowl sherd from the Pace McDonald site. Provenience: Unit 1, 40-50 cm bs.

Lithic Artifacts

Lithic artifacts from the latest rounds of archeological work at the Pace McDonald site include 366 specimens (Table 23). Over 92% of the lithic artifacts are lithic debris from the manufacture and maintenance of chipped stone tools. Slightly more than 6% of the artifacts are chipped stone tools, including arrow points, dart points, and various kinds of flake tools. The remainder of the lithic artifacts include three ground stone tools (0.8%) and one piece of fire-cracked rock (FCR, 0.3%). Artifacts in these two lithic artifact categories came from the Unit 1-3 excavations.

Table 23. Summary of Lithic Artifacts from December 2010-2011 Archeological Investigations at the Pace McDonald site.

Provenience	Arrow Point	Flake Tool	Dart Point	Lithic Debris	Ground stone Tool	FCR	N
December 2010 surface collection	1	4	–	68	–	–	73
Adkins East surface collection	4	4	2	51	–	–	61
Adkins West surface collection	–	2	1	48	–	–	51
Shovel Tests 1-6	–	–	–	13	–	–	13
Unit 1	–	1	–	77	1	1	80
Unit 2	1	2	–	50	1	–	54
Unit 3	1	1	–	31	1	–	34
Totals	7	14	3	338	3	1	366

FCR=fire-cracked rock

Chipped Stone Tools

Seven arrow points and fragments have been found in the latest investigations at the Pace McDonald site, including an arrow point blade from the December 2010 surface collection area northeast of Mound No. 1, and a unifacial fragment (of gray chert) from the Adkins East area (Table 24 and Figure 26d, g).

The identifiable arrow points include two Perdiz points (see Figure 26a, c) and three Steiner arrow points (see Figure 26b, h). The Perdiz points, generally considered to date after ca. A.D. 1200-1300 in East Texas Caddo sites, are both made of a non-local chert, and came from the Adkins East surface collection area. The occurrence of Steiner points, one of the earlier arrow point forms in the region, in the Adkins East area and the site area north of Mound No. 1, suggests that the Pace McDonald site was also

Table 24. Arrow points from the latest investigations at the Pace McDonald site.

Provenience (cm bs)	Type	raw material	L (mm)	W (mm)	TH (mm)	SW (mm)
Unit 2, 20-30	Steiner	gray chert	14.9+	15.5	2.5	4.6
Unit 3, 0-10	Steiner	quartzite	14.0	16.4	1.9	5.6
Adkins East	Steiner	grayish-yellow chert	15.4+	11.9	4.1	3.3
Adkins East	Perdiz	grayish-brown chert	20.0	10.9	3.2	4.3
Adkins East	Perdiz	light gray chert	16.0	9.5	3.1	3.9

L=length; W=width; TH=thickness; SW=stem width

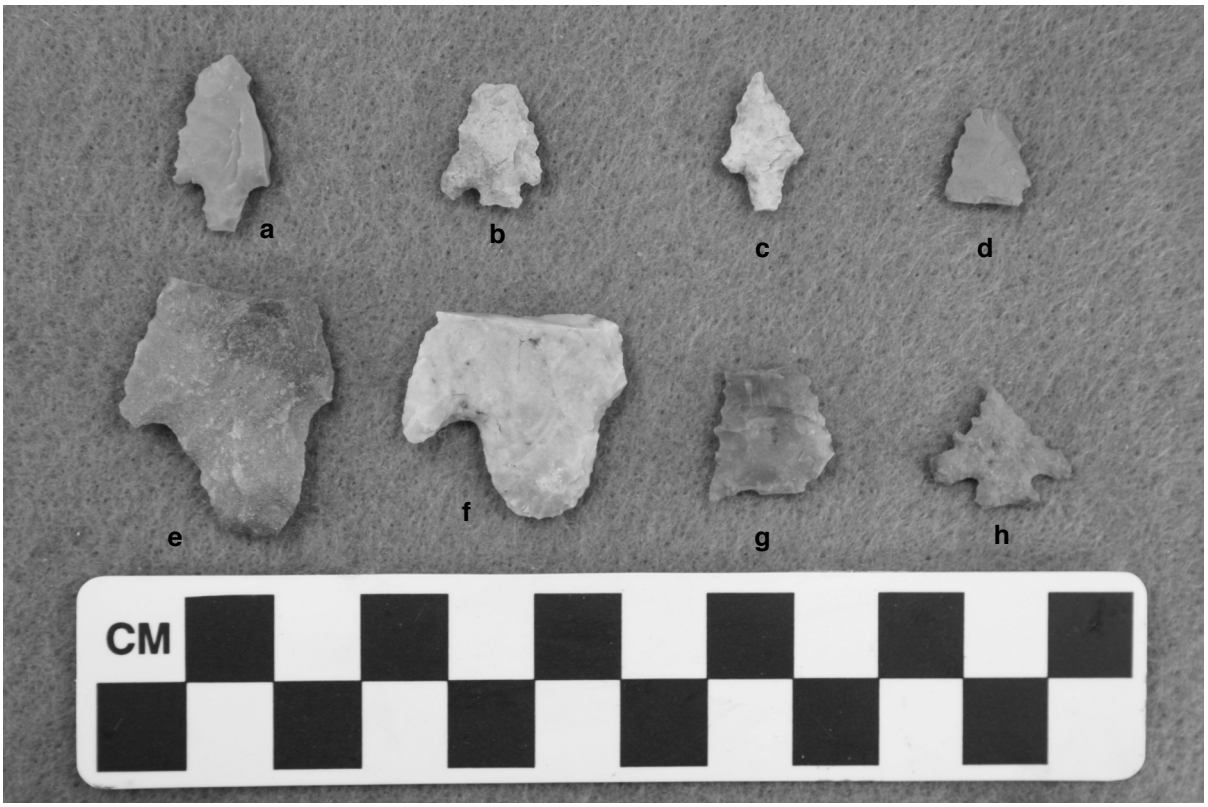


Figure 26. Arrow points and dart points from the December 2010-present investigations: a, c, Perdiz; b, h, Steiner; d, g, blade fragments; e-f, Gary, *var. Camden*. Provenience: a-f, Akins East surface collection area; g, Unit 2, 20-30 cm bs; h, Unit 3, 0-10 cm bs.

used to some extent around ca. A.D. 900-1000. Two of the three Steiner points are made from a non-local chert, while the third was made from a local quartzite (see Table 24).

Two of the dart points are contracting stem Gary, *var. Camden,* points with narrow stems and relatively thin blades (cf. Schambach 1982, 1998). They were found in the Adkins east surface collection area. One is made from a light gray chert and the other from a local quartzite (see Figure 26e-f). They range from at least 23.1-27.9 mm in length (both are broken along the blade), 24.0-26.0 mm in width, 4.3-5.3 mm in thickness, and the stem width ranges from 13.2-14.0 mm. A third Gary, *var. Camden* dart point was found in the Adkins West surface collection area. It was made from petrified wood, had resharpened blades that were 12.2 mm in width, it was 5.1 mm in thickness on the blade, and the stem width was only 11.0 mm. The *var. Camden* point dates to the latter part of the Woodland period, from ca. A.D. 200-700 (Schambach 1982, 1998), and their presence in two areas of the site indicates that part of it, at least, was occupied during the Woodland period.

Flake tools occur in each of the different areas at the site (Table 25), indicating that expedient cutting, scraping, graving, and shredding tools were part of the tool assemblages that characterize each intra-site area. It is not known if flake tools from the surface collection areas are from the Caddo occupation at Pace McDonald, but those recovered in Units 1-3 are from deposits in and above the midden zone identified in these units.

The flake tools include three scrapers, a graver, and a variety of more expedient tools on flakes with evidence of use wear along unilateral (n=7), bilateral (n=1), and distal edges (n=2); several of the tools have multiple worked edges from different kinds of use (see Table 25). All of the flake tools are made from chert, most commonly gray (n=6) and dark gray (n=2) cherts. There are three other expedient flake tools in the December 2010 surface collection area, along with a biface preform.

Table 25. Flake tools from the latest investigations at the Pace McDonald site.

Provenience (cm bs)	Use Wear Areas	Raw Material	Use Wear Length (mm)
Unit 1, 10-20	side scraper	gray chert	14.0
Unit 1, 30-40	bilateral flake tool	gray chert	11.0+, 12.0+
Unit 2, 30-40	side scraper, bilateral	reddish-brown chert	21.0+
Unit 2, 30-40	unilateral flake tool	gray chert	13.7+
Unit 3, 50-60	unilateral-denticulated flake tool	gray chert	12.0
Adkins East	unilateral flake tool	dark gray chert	10.0
Adkins East	unilateral and distal flake tool	gray chert	14.0+, 9.0
Adkins East	unilateral flake tool	dark gray chert	13.0
Adkins East	unilateral flake tool	reddish-brown chet	9.9
Adkins West	end scraper	gray chert	11.5
Adkins West	unilateral and distal flake tool; lateral and graver	reddish-gray chert	19.8, 12.2

Lithic Debris

A wide variety of different kinds and colors of lithic raw materials are represented in the Pace McDonald lithic debris (Table 26). This includes 22 colors of chert, as well as quartzite, petrified wood, chalcedony, quartz, siliceous shale, and ferruginous sandstone. The cherts comprise 85.4% of the lithic debris sample. The most common raw materials represented in the lithic debris are gray chert, dark gray chert, brownish-gray chert, quartzite, and brown chert.

The presence of high proportions of cortical flakes in virtually every raw material category suggests that pebbles and small cobbles of these raw materials were brought back to the Pace McDonald site for reduction and tool manufacture, probably the production of bifaces during the Archaic and Woodland period occupations, as opposed to the production of flakes suitable for the knapping of arrow points or for expedient use of the flakes for scraping, cutting, etc.

About 24% of the lithic debris are from pebbles of local raw material, principally brown chert and quartzite, available in stream gravels in the upper Neches River basin (see Anderson et al. 1974). A little over 2% of the lithic debris (black chert, quartz, and siliceous shale) may have come from Red River gravels in the northeastern part of East Texas, and these are derived from chert-bearing formations in the Ouachita Mountains of southeastern Oklahoma (Banks 1990:Figure 1.20). The remainder of the lithic debris (74%) is likely from stream and upland stream gravels in the Trinity River or Brazos River basins (Banks 1990:56-57), and these materials likely derived ultimately as outwash from Central Texas Edwards Plateau chert-bearing formations. Trinity River sources of knappable cherts would have been readily accessible (ca. 20 miles to the west) to more mobile Archaic and Woodland hunter-gatherers as well as the latter Caddo populations that settled year-round at the Pace McDonald site.

Table 26. Lithic Debris from the Pace McDonald site, December 2010 and Adkins east and west surface collection areas, shovel tests, and 1 x 1 m units.

Raw Materials	N	% of Sample	Percent Cortical
reddish-brown chert	2	0.6	100.0
honey-colored chert	2	0.6	100.0
root beer brown chert	1	0.3	100.0
dark grayish-white chert	1	0.3	100.0
yellowish-brown chert	1	0.3	100.0
dark brown chert	5	1.5	80.0
reddish-gray chert	4	1.2	75.0
yellowish-gray chert	21	6.4	66.7
grayish-white chert	3	0.9	66.7
red chert	8	2.4	62.5
dark grayish-brown chert	5	1.5	60.0
bluish-gray chert	4	1.2	50.0
dark gray-black chert	4	1.2	50.0
grayish-brown chert	19	5.8	47.4
quartzite	32*	9.8	46.9*
dark gray chert	39	12.0	46.2
black chert	5	1.5	40.0
petrified wood	8	2.4	37.5
light gray chert	20*	6.1	35.0*
brown chert	23	7.1	30.4
chalcedony	4	1.2	25.0
gray chert	73*	22.3	24.7*
brownish-gray chert	35*	10.7	17.1*
grayish-yellow chert	2	0.6	–
quartz	2	0.6	–
dark gray-blue chert	1	0.3	–
siliceous shale	1	0.3	–
ferruginous sandstone	1	0.3	–
Totals	326	100.0%	39.3 [of the total sample]

Raw materials in bold are considered to be local raw materials, i.e., available in the vicinity of the site and in the upper Neches River basin in stream gravels *includes cores

Ground stone Tools

One of the ground stone tools (Unit 1A, 40-50 cm bs) is a fragment of a ferruginous sandstone mano with one grinding surface. A ferruginous sandstone grinding slab fragment came from Unit 3 (40-50 cm bs), while a pitted stone fragment (recycled into use as a hot rock cooking element that became fire-cracked rock) came from Unit 2, 40-50 cm bs. All three ground stone tools are associated with the buried Middle Caddo midden deposits.

RADIOCARBON DATES

Two samples of charred plant remains were submitted for accelerator mass spectrometry (AMS) radiocarbon dating to Beta Analytic, Inc. from the Pace McDonald site. Both samples are from a 40 x 40 cm fine-screen column (Unit 1A) along one wall of Unit 1. The samples were selected to determine the earliest and later age of the buried midden deposits encountered in Unit 1.

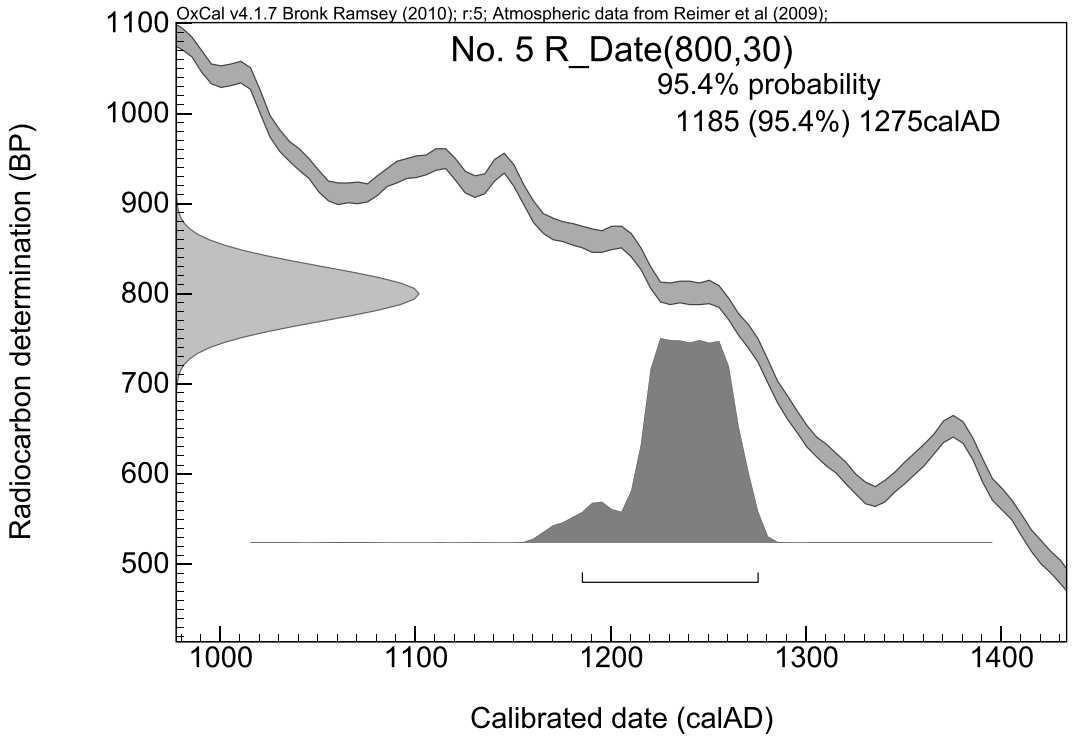
The first sample for AMS dating consisted of 0.22 g (n=20) of *Carya* sp. nutshell from 60-70 cm bs in the fine screen column. At 2 sigma (95.4% probability), the age range of this sample (Beta-305693) is AD 1200-1270 (Appendix 1), with a calibrated 2 sigma intercept of A.D. 1240. The second sample for AMS dating is from 40-50 cm bs in Unit 1A. It consisted of six cupules and four glumes of *Zea mays*. The 2 sigma calibration of these maize remains (Beta-305694) is A.D. 1290-1410, with calibrated 2 sigma intercepts of A.D. 1320, A.D. 1350, and A.D. 1390. These two dates suggest that the buried midden deposits accumulated over as little as 20-90 years to as much as 140-210 years.

Employing OxCal v4.1.7, the two radiocarbon dates from the buried midden deposits at the Pace McDonald site suggest that the buried midden deposits accumulated over as little as 10-70 years (A.D. 1210-1280) to as many as 20-129 years (A.D. 1275-1404) (Figure 27a-b). Peaks in the probability of the OxCal 2 sigma calibrations suggest the most likely age range for the midden accumulation is A.D. 1210-1340.

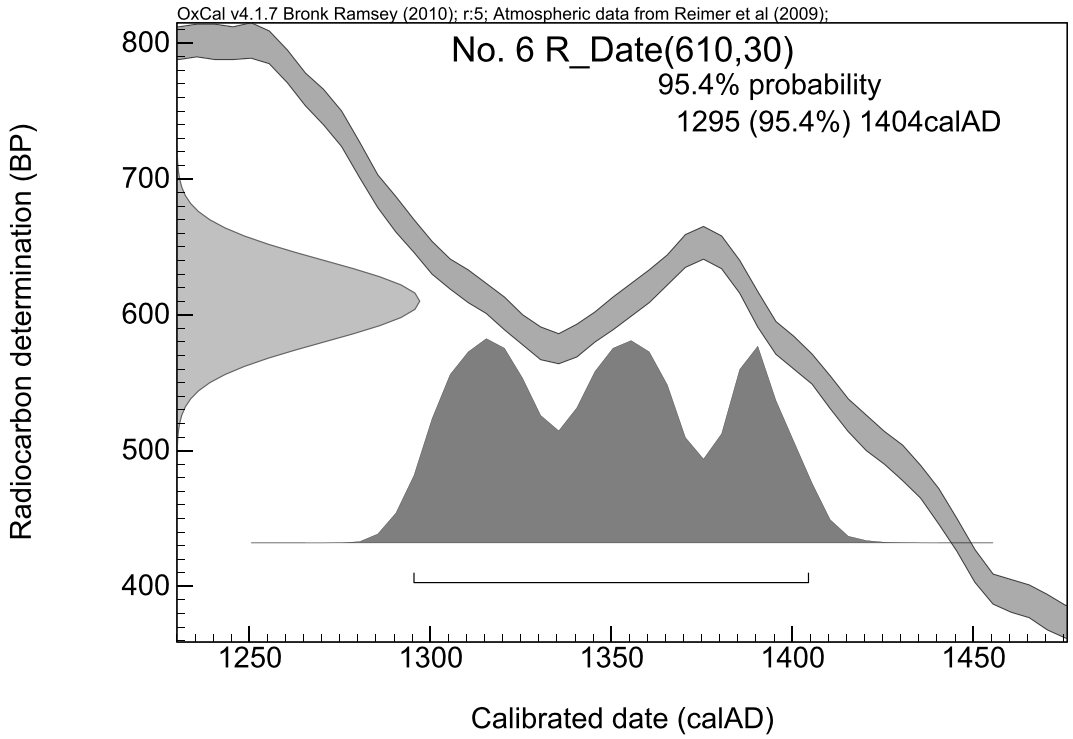
SUMMARY OF THE MATERIAL CULTURE REMAINS FROM THE PACE MCDONALD SITE

A wide range of sherds from decorated fine ware and utility ware vessels have been recovered from different contexts at the Pace McDonald site (Table 27). The fine wares include both engraved and red-slipped sherds, as well as one red-slipped-appliqued Maxey Noded Redware bottle sherd. Sherds from vessels decorated only with a red-slip (on one or both vessel surfaces) comprise an impressive 41% of the fine ware sherds from the Pace McDonald fine ware sherd assemblage. The abundance of red-slipped sherds, in conjunction with distinctive engraved sherds (with hatched zones, pendant triangles, cross-hatched, and curvilinear elements, as well as simple straight and geometric elements), and the Maxey Noded Redware bottle sherd, comprise substantial evidence that the ceramic sherds are from vessels made and used during Middle Caddo period times at the site.

Fine wares account for approximately 28% of the decorated sherds from the Pace McDonald site, indicating the regular access to and use of fine ware vessels in all areas of the site investigated to date (see Table 27). The highest percentages of fine wares are found in two surface collection areas—one near Mound No. 1 and the other south of Mound No. 2 (see Figure 9)—that apparently have extensive midden deposits. Either these are domestic residential areas where fine wares were widely used, or these are the locales where elite compounds were established, and perhaps where regular feasting events took place during the course of the mound occupations. In any case, further investigations of these two areas are warranted to establish their functional and social use within the context of the Pace McDonald community.



a



b

Figure 27. OxCal calibrations for radiocarbon samples from the Pace McDonald site (41AN51): a, Beta-305693; b, Beta-305694.

Table 27. Summary of Decorated Sherds, all Contexts at the Pace McDonald site.

Decorative method	TARL	4/10 SC	12/10 SC	ST	1 x 1 m	Adkins E SC	Adkins W SC	N
Engraved	29	16	5	3	42	13	1	109
Engraved-red-slipped	1	–	1	–	1	–	–	3
Red-slipped	20	13	10	2	28	4	–	77
Red-slipped-appliqued	–	–	–	–	1	–	–	1
Sub-total, fine ware	50	29	16	5	72	17	1	190
Incised	74	22	20	5	71	9	4	205
Tool punctated	37	11	22	2	55	8	1	136
Linear punctated	3	–	–	–	4	–	–	7
Fingernail punctated	24	11	3	–	19	2	–	59
Circular punctated	8	1	2	–	5	–	–	16
Cane punctated	1	–	–	–	–	–	–	1
Crescent punctated	–	–	1	–	–	–	–	1
Pinched	4	1	1	–	7	–	–	13
Incised-punctated	12	6	5	–	13	2	3	41
Appliqued	1	–	–	–	2	–	–	3
Appliqued-punctated	1	–	–	–	–	–	–	1
Brushed	5	2	1	–	5	–	–	13
Brushed-incised	–	–	–	–	1	–	–	1
Brushed-incised-punctated	–	–	–	–	1	–	–	1
Sub-total, utility ware	170	54	55	7	183	21	8	498
Totals	220	83	71	12	255	38	9	688

Decorated utility ware sherds comprise 72% of the Pace McDonald decorated sherds (see Table 27). The majority of these are from vessels with incised decorations (42% of the utility ware sherds) and punctated decorations (44%); most of the latter are tool punctated.

The incised decorative elements from the Pace McDonald site are overwhelmingly based on straight line and simple geometric elements, as only a few have either curvilinear or circular elements. The principal decorative motif consists of diagonal incised lines pitched either from the left to the right or pitched from the right to the left. Most of the incised rims have diagonal lines. Other rims have cross-hatched incised lines, diagonal opposed incised lines, or horizontal-diagonal incised lines. All of these rims are likely from Maydelle Incised jars. Among the body sherds, there are several common incised decorative elements. These include cross-hatched lines, opposed incised lines, and parallel incised lines.

The punctated sherds in the Pace McDonald ceramic collections include six different methods of punctation: tool; linear tool; fingernail; crescent-shaped; large circular; and cane. The tool punctated

sherds are the most common, accounting for 62% of the punctated sherd sample (see Table 27). The tool punctations tend to have been placed in rows on the rim and the vessel body, as is the case for the other methods of punctation, but free and randomly-placed tool punctations were also used on vessel bodies. Fingernail punctations account for 27% of the punctated sherds, and this form of decoration was primarily limited to vessel bodies. The fingernail punctations occur in rows (horizontal and vertical), while other body sherds have randomly or freely-placed fingernail punctates. Cane, large circular, crescent-shaped, and linear tool punctations have rows of punctations as their principal decorative motif. One of the punctated sherds in this group is a non-slipped bottle sherd that compares favorably to the punctated variety of Maxey Noded Redware with rows of small crescent-shaped punctations on what is likely the upper body of the vessel.

Incised-punctated sherds comprise 8.2% of all the utility ware sherds from the site; the highest proportion of incised-punctated sherds are from the surface collection near Mound No. 1 (see Table 27). Most of these sherds have a tool punctated decorative element, with lesser amounts that have been decorated with large circular punctations, fingernail punctations, and cane punctations. Only a few incised-punctated sherds have circular or curvilinear incised lines with punctate-filled zones, and the remainder of the incised-punctated sherds have straight, parallel, horizontal, or diagonal incised lines on the rim, typically forming incised triangles filled with punctations on the rims of Maydelle Incised jars. These zones are filled with cane punctations, tool punctations, and fingernail punctations.

There are a few pinched sherds (2.6% of the utility wares) from Killough Pinched vessels (see Table 27). The sherds have straight, opposed, vertical, and curvilinear ridges that were spaced so as to have covered the vessel body.

Approximately 3% of the utility ware sherds from the Pace McDonald site have brushed decorations, either as the sole form of decoration, or in combination with incised, or incised-punctated elements (see Table 27). The low frequency of brushed vessels among the utility wares in the assemblage is one of the distinctive features of the decorated ceramics from the site, having more in common then with Middle and Late Caddo assemblages in the upper Sabine River basin where brushing is not a common decorative method for utility wares than it does with Middle or Late Caddo ceramic assemblages in the upper Neches River basin (see Perttula 2011a), where assemblages with 50-80% brushed sherds are not uncommon after ca. A.D. 1400.

The Pace McDonald site ceramic vessels with tempered primarily with grog or crushed sherds. Burned bone was a secondary temper, found in only 13.7% of the sherds where temper has been examined (Table 28). There is very little difference in the use of bone temper between the plain wares, utility wares, and fine wares (ranging from 10.2-17.6%).

The fact that grog is the primary temper among all wares at the Pace McDonald site strongly suggests that the ceramic assemblage belongs to the beginning years of the Upper Neches River ceramic tradition (Perttula 2011a:298-300, 315-318 and Figure 6-70). Ceramic tradition means a single, coherent, community of technological and stylistic practice specific to the Caddo peoples of this area. The predominant and key practice of Caddo potters living in the upper Neches River basin was to make grog-tempered plain wares, utility ware, and fine wares through time, beginning after ca. A.D. 900. Caddo potters in the region, and at Pace McDonald, would have discovered the advantages of grog-tempered pastes through trial and error, experience, and learned cultural traditions.

Lithic artifacts are not particularly common in the Pace McDonald artifact assemblage (Table 29). Tools include a variety of different kinds of arrow points and dart points, ground stone tools (including celts), expedient flake tools and scrapers, a modicum of lithic debris (suggesting that chipped stone tool manufacture was not a key activity that took place at the site), even considering that there is a bias in its collection from the 1930s work done by The University of Texas, and one fire-cracked rock.

Table 28. Use of Bone Temper in the Pace McDonald site ceramic assemblage, all collections.

Ware	No. of Sherds	No. with bone temper	Percent
Plain ware	2200	291	13.6
Fine ware	166	17	10.2
Utility ware	414	73	17.6
Totals	2780	381	13.7

Note: does not include Unit 1 sherds.

Table 29. Summary of Lithic Artifacts from the Pace McDonald site, all collections.

Provenience	Arrow Point	Flake Tool	Dart Point	Lithic Debris	Ground stone Tool	FCR	N
TARL	31	3	44	11	6	–	95
April 2010 work	1	1	–	42	–	–	44
December 2010-2011 work	7	14	3	338	3	1	366
Totals	39	18	47	391	9	1	505

There is no evidence for use of any specialized chipped stone or ground stone tool kits in the meager assemblage, or evidence for the mass processing of plants or animal foods. Rather, the assemblage is a product of multiple occupations preceding the primary Middle Caddo component, as denoted by different styles and types of projectile points as well as a product of the Middle Caddo occupation. The hunting of game animals was clearly an important task accomplished with the arrow points and dart points, and apparently only expedient flake tools were used in the processing of game animals for meat, hides, and bone tools. Ground stone tools were used for plant food processing, wood working and tree-felling, and the one polished stone may have been used in the smoothing and burnishing of ceramic vessels made on site. Most of the ground stone tools appear to have been in use during the Middle Caddo occupation.

Dart points outnumber arrow points in the Pace McDonald chipped stone tools by a count of 47 to 39 (see Table 29), indicating regular use of the site prior to ca. 1200-1300 years ago. More than half of the dart points are types that were made and used during the Woodland period (ca. 2500-1200 years B.P.), including Gary, Kent, and Godley (Table 30). About 58% of these Woodland points were made from chert, some of which are probably from non-local raw material sources.

The other half of the dart points from the Pace McDonald site are Late Archaic (ca. 5000-2500 years B.P.) types and forms, except perhaps for the untyped expanding stem forms, as more complete forms such as these have been recovered from Middle Archaic (ca. 8000-5000 years B.P.) components (see Girard et al. 2011). Chert use is much higher—at 87%--among the Archaic point types and forms than was the case for the Woodland period projectile points, which may reflect changing mobility patterns of hunting-gathering groups as well as the geographic scale and intensity of settlement through time.

The arrow points found at the Pace McDonald are dominated by Alba and Perdiz types (see Table 30). The recovery of Steiner and Catahoula points in the assemblage is notable, and suggests some use of the landform in the period between ca. A.D. 700-1000, during the initial and early use of arrow points as hunting tools. Local lithic raw materials were important sources of tool stone during this late

Table 30. Arrow points and dart points from the Pace McDonald site, all collections.

Type	No.	Percentage made from chert
Arrow points		
Alba	17	94
Possible Alba preform	1	100
Catahoula	3	0
Perdiz	9	100
Steiner	3	67
Unidentified	6	83
Subtotal, arrow points	39	84
Dart points		
Gary	19	53
Kent	3	100
Godley-like	2	50
Palmillas	2	100
Williams	1	100
Dawson	1	100
Wells	1	100
Straight stem and flat base	13	77
Expanding stem	1	100
Expanding/narrow stem and flat base	2	100
Expanding stem and concave base	1	100
Expanding to straight stem	1	100
Subtotal, dart points	47	72
Totals	84	77

part of the Woodland period and early part of the Caddo era. In the case of the Alba and Perdiz points, more than 96% were made from cherts, some of which are likely from non-local (i.e., Central Texas) raw material sources.

The abundance of both Alba and Perdiz points at the Pace McDonald site suggests there are sequent Caddo occupations there, since these point types are not considered to be contemporaneous types in East Texas. The intra-site history of settlement and mound construction still remains to be established, and at this point it is not clear if there are discrete clusters of Caddo archaeological deposits characterized by either one or the other of the two arrow point forms. At the George C. Davis site, Alba points may date as early as ca. A.D. 850 or as late as A.D. 1300 (see Story 2000), while Perdiz points in East Texas are common only after ca. A. D. 1250. Thus, there is a small temporal

window (ca. A.D. 1250-1300) when both arrow point styles may have been in use, and this temporal window in the early part of the Middle Caddo period seems reasonably to be the period when the primary Caddo component at the Pace McDonald site began.

Plant Identifications from the Pace McDonald Site (41AN51): a Caddo Mound Center in Anderson County, Texas

Leslie L. Bush

Five flotation samples, five fine-screen samples, and four ¼-inch screen samples from the Pace McDonald site (41AN51) were submitted for identification and analysis of the recovered plant materials from recent excavations. Pace McDonald is a Middle Caddo mound center located on Mound Prairie Creek in the Neches River drainage (Perttula 2011; Perttula et al. 2011).

LABORATORY METHODS

Processing

One flotation sample and one fine screen sample were collected from each of five archeological contexts at Pace McDonald. Five liter flotation samples were taken from each of three levels of Unit 1, and four liter flotation samples were taken from one level each of Units 2 and 3. Four gallon (15.14 liter) fine screen samples were collected from each context as well. Flotation samples were processed in a manual flotation system with heavy fraction mesh of 1/32-inch (0.79 mm) and light fractions caught in standard nylon hosiery (openings approximately 0.1 mm unstretched, 0.5 mm at maximum stretch). Separation of plant material into the light fractions was imperfect, so both heavy and light fractions were examined in the laboratory. The fine screen samples were processed through the same 1/32-inch (0.79 mm) mesh as the flotation heavy fractions.

Samples were treated according to standard procedures at the Macrobotanical Analysis laboratory in Manchaca, Texas. All samples were subject to full radiocarbon protocols to retain suitability for radiocarbon dating. Samples were sorted on freshly cleaned glassware and handled only with latex gloves and metal forceps. Screens used to size-sort material were cleaned between samples. Contact with paper and other plant products was avoided. Only one sample was open at a time in the laboratory. Writing instruments used for data recording of samples were plastic mechanical pencils.

Sorting of samples also followed standard procedures for flotation and fine screen samples (Pearsall 2000). Each sample was size-sorted through a stack of graduated geologic mesh to facilitate sorting. Materials that did not pass through the No. 10 mesh (2 mm) were completely sorted, and all carbonized botanical remains were counted, weighed, recorded, and labeled. Weights were measured with an Ohaus Scout II 200 x 0.01 g electronic balance. Uncarbonized botanical material greater than 2 mm (usually rootlets) was weighed, recorded, and labeled as "contamination." Materials that fell through the 2 mm mesh ("residue") were examined under a stereoscopic microscope at 7-45 X magnification for carbonized botanical remains. Identifiable material other than wood, corn, and nutshell were removed from the residue, counted, weighed, recorded, and labeled. Uncarbonized seeds were recorded on a presence/absence basis on laboratory forms.

Wood charcoal identification was attempted for 20 randomly-selected specimens larger than 2 mm from each sample, or for all wood charcoal fragments when 20 or fewer were present. Wood charcoal fragments were snapped to reveal a transverse section and examined under a stereoscopic microscope at 28-180 X magnification. When necessary, tangential or radial sections were examined for ray seriation, presence of spiral thickenings, types and sizes of intervessel pitting, and other minute characteristics that can only be seen at the higher magnifications of this range.

Botanical materials were identified to the lowest possible taxonomic level by comparison to materials in the Macrobotanical Analysis comparative collection and through the use of standard reference works (e.g., Core et al. 1979; Davis 1993; Hoadley 1990; InsideWood 2004; Martin and Barkley 1961; Musil

1963; Panshin and de Zeeuw 1980). Plant nomenclature follows that of the PLANTS Database (USDA, NCRS 2011).

Results

Table 31 summarizes the archeological plant remains recovered from the Pace McDonald site. The same plants remains are detailed by unit, level and type of sample in Table 32. Wood, nutshell, and bark were the only plant parts recovered by ¼-inch screening. They are shown in Table 33.

Table 31. Carbonized plant remains from the Pace McDonald site (41AN51).

All sources, all contexts (23 liters flotation, 75.7 liters fine screen)

		Count	Weight (g)
Wood charcoal			
Quercus subg. Quercus	White group oak	54	0.48
Quercus sp.	Oak	49	0.26
Indeterminable	Indeterminable	2	0.07
Carya sp.	Hickory	22	0.28
Quercus subg. Lobatae	Red group oak	21	0.21
Hardwood	Hardwood	16	0.18
Diffuse-porous hardwood	Diffuse-porous hardwood	3	0.04
Liquidambar styraciflua	Sweetgum	1	0.02
Ulmaceae	Elm/Hackberry family	1	0.01
Bark		1	0.01
Not examined	Not examined	399	1.59
Nutshell			
Carya sp.	Hickory	222	2.59
Juglandaceae	Hickory/walnut family	104	0.62
Quercus sp.	Acorn	92	0.25
Juglans nigra	Black walnut	2	0.02
Carya illinoinensis	Pecan	1	0.01
Corn (*Zea mays*)			
kernels		46	0.18
cupules and glumes		43	0.20
starchy fragments (prob. corn kernels)		15	0.06
Stems			
Poaceae	Cane and grass	10	0.05
Seeds			
Rhus sp.	Sumac	2	
Poaceae	Grass family	1	
Strophostyles sp.	Fuzzybean	1	
Vitaceae	Grape family	1	
Indeterminable botanical		52	0.21

Table 32. Listing by unit and depth of carbonized plant remains from flotation and fine-screening at the Pace McDonald site.

Unit and Level	Recovery method	Plant part	Botanical name	Common name	Count	Weight (g)	Comments
Unit 1, 40-50	Fine screen	Indeterminable	Indeterminable	Starchy fragments	3	0.02	
Unit 1, 40-50	Fine screen	Indeterminable			2	0.02	
Unit 1, 40-50	Fine screen	Nutshell	*Carya* sp.	Hickory	42	0.61	
Unit 1, 40-50	Flotation	Nutshell	*Carya* sp.	Hickory	14	0.12	
Unit 1, 40-50	Fine screen	Nutshell	Juglandaceae	Hickory/walnut family	25	0.23	
Unit 1, 40-50	Flotation	Nutshell	Juglandaceae	Hickory/walnut family	2	0.01	
Unit 1, 40-50	Fine screen	Nutshell	*Quercus* sp.	Acorn	15	0.03	
Unit 1, 40-50	Flotation	Nutshell	*Quercus* sp.	Acorn	8	0.04	
Unit 1, 40-50	Fine screen	Rachis	*Zea mays*	Corn	10	0.04	6 cupule frags, 4 glume frags
Unit 1, 40-50	Flotation	Rachis	*Zea mays*	Corn	2	0.01	cupule fragments
Unit 1, 40-50	Fine screen	Seed	*Strophostyles* sp.	Fuzzybean	1	0.01	1 cotelydon
Unit 1, 40-50	Fine screen	Seed	*Zea mays*	Corn	8	0.03	all frags
Unit 1, 40-50	Flotation	Seed	*Zea mays*	Corn	1	0.01	fragment
Unit 1, 40-50	Fine screen	Wood	*Carya* sp.	Hickory	5	0.07	pecan type
Unit 1, 40-50	Flotation	Wood	*Carya* sp.	Hickory	1	0.01	no earlywood
Unit 1, 40-50	Fine screen	Wood	Hardwood	Hardwood	6	0.09	
Unit 1, 40-50	Fine screen	Wood	Not examined	Not examined	116	0.51	
Unit 1, 40-50	Flotation	Wood	*Quercus* sp.	Oak	7	0.03	
Unit 1, 40-50	Fine screen	Wood	*Quercus* subg. *Lobatae*	Red group oak	3	0.02	
Unit 1, 40-50	Fine screen	Wood	*Quercus* subg. *Quercus*	White group oak	6	0.07	
Unit 1, 40-50	Flotation	Wood	*Quercus* subg. *Quercus*	White group oak	4	0.01	

Table 32. Listing by unit and depth of carbonized plant remains from flotation and fine-screening at the Pace McDonald site, cont.

Unit and Level	Recovery method	Plant part	Botanical name	Common name	Count	Weight (g)	Comments
Unit 1, 50-60	Flotation	Bark			1	0.01	
Unit 1, 50-60	Fine screen	Indeterminable	Indeterminable	Starchy fragments	3	0.01	
Unit 1, 50-60	Fine screen	Indeterminable			23	0.08	
Unit 1, 50-60	Flotation	Indeterminable			3	0.02	
Unit 1, 50-60	Fine screen	Nutshell	*Carya* sp.	Hickory	68	0.92	
Unit 1, 50-60	Flotation	Nutshell	*Carya* sp.	Hickory	11	0.13	
Unit 1, 50-60	Fine screen	Nutshell	Juglandaceae	Hickory/walnut family	24	0.12	
Unit 1, 50-60	Flotation	Nutshell	Juglandaceae	Hickory/walnut family	1	0.01	
Unit 1, 50-60	Fine screen	Nutshell	*Juglans nigra*	Black walnut	2	0.02	
Unit 1, 50-60	Fine screen	Nutshell	*Quercus* sp.	Acorn	25	0.07	
Unit 1, 50-60	Flotation	Nutshell	*Quercus* sp.	Acorn	13	0.03	
Unit 1, 50-60	Fine screen	Rachis	*Zea mays*	Corn	10	0.04	9 cupules (1 whole), 1 glume
Unit 1, 50-60	Fine screen	Seed	*Rhus* sp.	Sumac	1	0.01	
Unit 1, 50-60	Fine screen	Seed	*Zea mays*	Corn	7	0.05	
Unit 1, 50-60	Flotation	Seed	*Zea mays*	Corn	3	0.01	fragments
Unit 1, 50-60	Fine screen	Stem	*Arundinaria gigantea*	Cane	6	0.03	
Unit 1, 50-60	Flotation	Stem	*Arundinaria gigantea*	Cane	1	0.01	
Unit 1, 50-60	Fine screen	Wood	*Carya* sp.	Hickory	6	0.12	
Unit 1, 50-60	Flotation	Wood	*Carya* sp.	Hickory	2	0.02	
Unit 1, 50-60	Fine screen	Wood	Diffuse-porous hardwood	Diffuse-porous hardwood	1	0.01	
Unit 1, 50-60	Fine screen	Wood	Hardwood	Hardwood	1	0.01	
Unit 1, 50-60	Flotation	Wood	Hardwood	Hardwood	2	0.01	
Unit 1, 50-60	Fine screen	Wood	Not examined	Not examined	99	0.47	

Table 32. Listing by unit and depth of carbonized plant remains from flotation and fine-screening at the Pace McDonald site, cont.

Unit and Level	Recovery method	Plant part	Botanical name	Common name	Count	Weight (g)	Comments
Unit 1, 50-60	Flotation	Wood	Not examined	Not examined	5	0.02	
Unit 1, 50-60	Flotation	Wood	*Quercus* sp.	Oak	9	0.04	
Unit 1, 50-60	Fine screen	Wood	*Quercus* subg. *Lobatae*	Red group oak	5	0.06	
Unit 1, 50-60	Flotation	Wood	*Quercus* subg. *Lobatae*	Red group oak	2	0.02	
Unit 1, 50-60	Fine screen	Wood	*Quercus* subg. *Quercus*	White group oak	7	0.06	
Unit 1, 50-60	Flotation	Wood	*Quercus* subg. *Quercus*	White group oak	4	0.03	
Unit 1, 50-60	Flotation	Wood	Ulmaceae	Elm/Hackberry family	1	0.01	
Unit 1, 60-70	Flotation	Indeterminable			3	0.01	
Unit 1, 60-70	Fine screen	Nutshell	*Carya* sp.	Hickory	20	0.22	
Unit 1, 60-70	Flotation	Nutshell	*Carya* sp.	Hickory	4	0.04	
Unit 1, 60-70	Fine screen	Nutshell	Juglandaceae	Hickory/walnut family	8	0.04	
Unit 1, 60-70	Flotation	Nutshell	Juglandaceae	Hickory/walnut family	1	0.01	
Unit 1, 60-70	Fine screen	Nutshell	*Quercus* sp.	Acorn	14	0.03	
Unit 1, 60-70	Flotation	Nutshell	*Quercus* sp.	Acorn	4	0.01	
Unit 1, 60-70	Fine screen	Rachis	*Zea mays*	Corn	4	0.01	cupule fragments
Unit 1, 60-70	Flotation	Rachis	*Zea mays*	Corn	2	0.01	1 cupule, 1 inner cupule?
Unit 1, 60-70	Flotation	Seed	*Zea mays*	Corn	1	0.01	fragment
Unit 1, 60-70 naria, 1 clearly not	Fine screen	Stem	Poaceae	Grass family	3	0.01	2 prob. Arundi-
Unit 1, 60-70	Fine screen	Wood	*Carya* sp.	Hickory	1	0.01	
Unit 1, 60-70	Flotation	Wood	*Carya* sp.	Hickory	2	0.01	no earlywood
Unit 1, 60-70	Fine screen	Wood	Hardwood	Hardwood	4	0.04	

Table 32. Listing by unit and depth of carbonized plant remains from flotation and fine-screening at the Pace McDonald site, cont.

Unit and Level	Recovery method	Plant part	Botanical name	Common name	Count	Weight (g)	Comments
Unit 1, 60-70	Flotation	Wood	Hardwood	Hardwood	1	0.01	
Unit 1, 60-70	Fine screen	Wood	Not examined	Not examined	59	0.22	
Unit 1, 60-70	Flotation	Wood	*Quercus* sp.	Oak	6	0.02	
Unit 1, 60-70	Fine screen	Wood	*Quercus* subg. *Lobatae*	Red group oak	3	0.03	
Unit 1, 60-70	Flotation	Wood	*Quercus* subg. *Lobatae*	Red group oak	1	0.01	
Unit 1, 60-70	Fine screen	Wood	*Quercus* subg. *Quercus*	White group oak	12	0.13	
Unit 1, 60-70	Flotation	Wood	*Quercus* subg. *Quercus*	White group oak	4	0.02	
Unit 2, 40-50	Flotation	Indeterminable	Indeterminable	Starchy fragments	1	0.01	
Unit 2, 40-50	Fine screen	Indeterminable			2	0.01	
Unit 2, 40-50	Flotation	Indeterminable			2	0.02	
Unit 2, 40-50	Fine screen	Nutshell	*Carya* sp.	Hickory	24	0.2	
Unit 2, 40-50	Flotation	Nutshell	*Carya* sp.	Hickory	6	0.07	
Unit 2, 40-50	Fine screen	Nutshell	Juglandaceae	Hickory/walnut family	4	0.03	
Unit 2, 40-50	Flotation	Nutshell	Juglandaceae	Hickory/walnut family	3	0.02	
Unit 2, 40-50	Fine screen	Nutshell	*Quercus* sp.	Acorn	7	0.02	
Unit 2, 40-50	Flotation	Nutshell	*Quercus* sp.	Acorn	1	0.01	
Unit 2, 40-50	Fine screen	Rachis	*Zea mays*	Corn	4	0.01	fragments
Unit 2, 40-50	Flotation	Rachis	*Zea mays*	Corn	4	0.02	fragments; 3 cupules, 1 glume
Unit 2, 40-50	Fine screen	Seed	Poaceae	Grass family	1	0.01	
Unit 2, 40-50	Fine screen	Seed	Vitaceae	Grape family	1	0.01	
Unit 2, 40-50	Fine screen	Seed	*Zea mays*	Corn	3	0.02	fragments
Unit 2, 40-50	Flotation	Seed	*Zea mays*	Corn	1	0.01	fragment

Table 32. Listing by unit and depth of carbonized plant remains from flotation and fine-screening at the Pace McDonald site, cont.

Unit and Level	Recovery method	Plant part	Botanical name	Common name	Count	Weight (g)	Comments
Unit 2, 40-50	Fine screen	Wood	*Carya* sp.	Hickory	1	0.02	
Unit 2, 40-50	Fine screen	Wood	Diffuse-porous hardwood	Diffuse-porous hardwood	2	0.03	
Unit 2, 40-50	Flotation	Wood	Hardwood	Hardwood	1	0.01	
Unit 2, 40-50	Fine screen	Wood	Indeterminable	Indeterminable	2	0.07	
Unit 2, 40-50	Fine screen	Wood	Not examined	Not examined	26	0.08	
Unit 2, 40-50	Fine screen	Wood	*Quercus* sp.	Oak	11	0.1	
Unit 2, 40-50	Flotation	Wood	*Quercus* sp.	Oak	2	0.01	
Unit 2, 40-50	Fine screen	Wood	*Quercus* subg. *Lobatae*	Red group oak	2	0.02	
Unit 2, 40-50	Flotation	Wood	*Quercus* subg. *Lobatae*	Red group oak	1	0.01	
Unit 2, 40-50	Fine screen	Wood	*Quercus* subg. *Quercus*	White group oak	2	0.02	
Unit 2, 40-50	Flotation	Wood	*Quercus* subg. *Quercus*	White group oak	5	0.07	
Unit 3, 40-50	Fine screen	Indeterminable	Indeterminable	Starchy fragments	8	0.02	
Unit 3, 40-50	Fine screen	Indeterminable			16	0.04	
Unit 3, 40-50	Flotation	Indeterminable			1	0.01	
Unit 3, 40-50	Fine screen	Nutshell	*Carya illinoinensis*	Pecan	1	0.01	
Unit 3, 40-50	Fine screen	Nutshell	*Carya* sp.	Hickory	29	0.27	
Unit 3, 40-50	Flotation	Nutshell	*Carya* sp.	Hickory	4	0.01	
Unit 3, 40-50	Fine screen	Nutshell	Juglandaceae	Hickory/walnut family	35	0.14	
Unit 3, 40-50	Flotation	Nutshell	Juglandaceae	Hickory/walnut family	1	0.01	
Unit 3, 40-50	Fine screen	Nutshell	*Quercus* sp.	Acorn	5	0.01	
Unit 3, 40-50	Fine screen	Rachis	*Zea mays*	Corn	10	0.04	
Unit 3, 40-50	Flotation	Seed	*Rhus* sp.	Sumac	1	0.01	fragment
Unit 3, 40-50	Fine screen	Seed	*Zea mays*	Corn	13	0.05	fragments

Table 32. Listing by unit and depth of carbonized plant remains from flotation and fine-screening at the Pace McDonald site, cont.

Unit and Level	Recovery method	Plant part	Botanical name	Common name	Count	Weight (g)	Comments
Unit 3, 40-50	Flotation	Seed	*Zea mays*	Corn	6	0.01	fragments
Unit 3, 40-50	Fine screen	Wood	*Carya* sp.	Hickory	1	0.01	
Unit 3, 40-50	Flotation	Wood	*Carya* sp.	Hickory	3	0.01	
Unit 3, 40-50	Fine screen	Wood	Hardwood	Hardwood	1	0.01	
Unit 3, 40-50	Flotation	Wood	*Liquidambar styraciflua*	Sweetgum	1	0.02	
Unit 3, 40-50	Fine screen	Wood	Not examined	Not examined	94	0.29	
Unit 3, 40-50	Fine screen	Wood	*Quercus* sp.	Oak	11	0.05	
Unit 3, 40-50	Flotation	Wood	*Quercus* sp.	Oak	3	0.01	
Unit 3, 40-50	Fine screen	Wood	*Quercus* subg. *Lobatae*	Red group oak	3	0.02	
Unit 3, 40-50	Flotation	Wood	*Quercus* subg. *Lobatae*	Red group oak	1	0.02	
Unit 3, 40-50	Fine screen	Wood	*Quercus* subg. *Quercus*	White group oak	4	0.04	
Unit 3, 40-50	Flotation	Wood	*Quercus* subg. *Quercus*	White group oak	6	0.03	

Table 33. Carbonized material from ¼-inch screen from the Pace McDonald site.

Unit and Level	Plant part	Botanical name	Common name	Count	Weight (g)	Comments
Unit 1, 50-60	Nutshell	*Carya* sp.	Hickory	1	0.19	
Unit 1, 60-70	Bark			1	0.05	
Unit 1, 60-70	Wood	*Quercus* subg. *Lobatae*	Red group oak	3	0.20	
Unit 1, 60-70	Wood	*Carya* sp.	Hickory	1	0.01	
Unit 3, 40-50	Nutshell	*Carya* sp.	Hickory	1	0.15	
Unit 3, 40-50	Wood	*Carya* sp.	Hickory	1	0.05	
Unit 3, 40-50	Wood	*Quercus* subg. *Lobatae*	Red group oak	1	0.09	
Unit 1, 70-80	Nutshell	*Carya* sp.	Hickory	1	0.30	broken in transit; estimated MNI =1
Unit 1, 70-80	Wood	*Quercus* sp.	Oak	2	0.20	
Unit 1, 70-80	Wood	*Carya* sp.	Hickory	1	0.04	

Archeological versus modern plants

Uncarbonized seeds were present in nine of 10 samples (Table 34). Uncarbonized seeds are a common occurrence on most archeological sites, but they usually represent seeds of modern plants that have made their way into the soil either through their own dispersal mechanisms or by faunalturbation, floralturbation, or argilliturbation (Bryant 1985:51-52; Miksicek 1987:231-232). In all except the driest areas of North America, uncarbonized plant material on open-air sites can be assumed to be of modern origin unless compelling evidence suggests otherwise (Lopinot and Brussell 1982; Miksicek 1987:231). The Pace McDonald site has been in pasture for several years, and the uncarbonized seeds recovered consist of grasses and forbs typical of pasture situations. They are interpreted as modern here.

Fine screening versus flotation

The weight of plant remains recovered per volume of soil was approximately the same for fine screening and flotation. 6.22 g of plant material were recovered in the 75.7 liters of fine screened matrix, as opposed to 1.76 g of plant material in the 23 liters of flotation matrix. Plant density (g/l) is thus 0.82 for fine screen and 0.77 for flotation. As expected, seeds smaller than approximately 0.8 mm were recovered only in flotation. These include maygrass and chenopodium, which were cultivated at various places and times in prehistoric North America (Fritz 1990). Flotation recovery is critical to understanding the history of these plants in Texas.

Wood charcoal

A total of 3.42 g of wood charcoal was recovered via flotation and fine-screening, with an additional 0.59 g in the ¼-inch screen samples from the site. Identification was attempted for 201 wood charcoal fragments, of which 171 could be identified to family, genus, or species (Figure 28). Eight-two percent of identified specimens were oaks, with hickory (15 percent) making up most of the remainder. When

Table 34. Uncarbonized seeds from the Pace McDonald site.

Unit		**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**3**	**3**
Level		**40-50**	**40-50**	**50-60**	**50-60**	**60-70**	**60-70**	**40-50**	**40-50**	**40-50**	**40-50**
Recovery		Flotation	Fine screen	Flotation	Fine screen	Flotation	Fine screen	Flotation	Fine screen	Flotation	Fine screen
Botanical Name	**Common Name**										
Chenopodium sp.	Goosefoot								X		
Croton sp.	Croton		X						X		X
Mollugo verticillata	Carpetweed									X	
Panicodae	Panicoid grass				X				X		
Poaceae	Grass family		X	X					X		
Setaria sp.	Bristlegrass	X	X	X	X		X	X		X	X
Sida sp.	Sida						X				

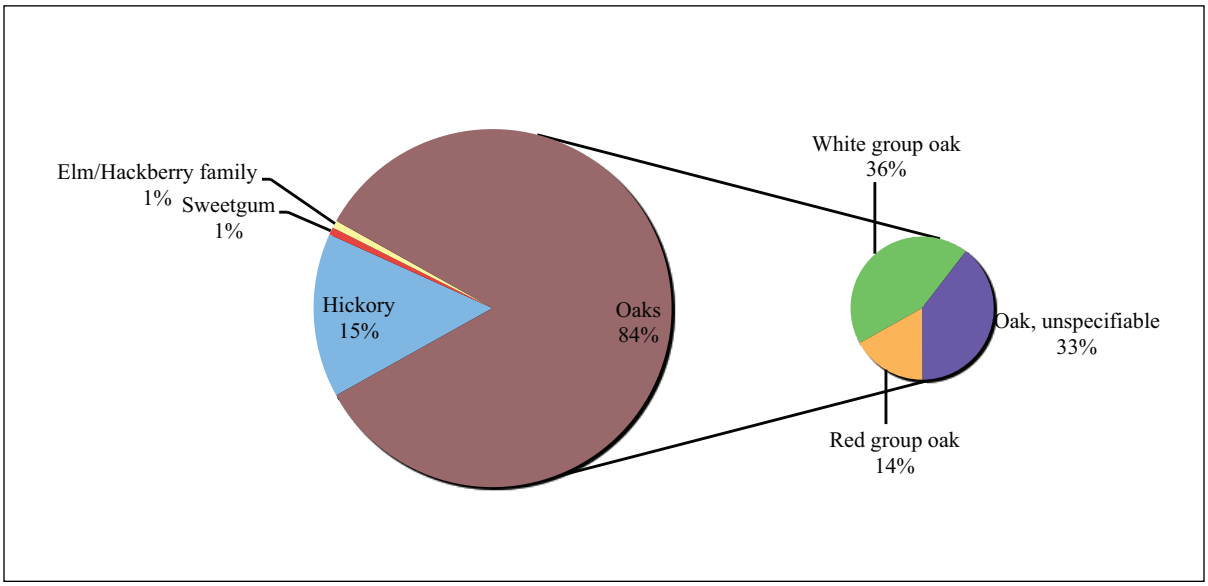


Figure 28. Wood charcoal (n=171) from the Pace McDonald site (41AN51).

diagnostic tissue was available for examination, the hickory wood could be assigned to the pecan type, with banded parenchyma present in the earlywood. The wood taxa at Pace McDonald are consistent with tree species that would have been present in the immediate vicinity of the site. The absence of pine may reflect the moderately small sample size, deliberate selection against pine as a fuel wood, or possibly the absence of pine trees in the area during one of the grass peaks in the pollen record (xeric episodes) noted by Bousman (1998).

Agriculture products

Corn was the only agricultural product recovered, and it was present in every sample. Corn kernels slightly outnumbered cupule and glume fragments. Paul Welch and Margaret Scarry point out that differences in the distribution of kernels and cupules has significance for ancient social practice, as it indicates a difference between corn consumption and corn processing (Welch and Scarry 1995). In the Moundville settlement system, there is an inverse correlation between plant processing waste and high status sites or locations (Welch and Scarry 1995:406).

Data from ceremonial areas are sparse in East Texas since excavations of these highly-visible areas often took place before flotation or even fine screen recovery was common. A ceremonial precinct and several residential areas were investigated at Pine Tree Mound (41HS15), however (Table 35). Kernel:cupule ratios ranged from less than 0.01 to 0.02 in the four residential areas that yielded corn whereas the ratio in the ceremonial precinct was 0.44 (Bush 2009). In this context, the kernel:cupule ratio of 0.86 at Pace McDonald is higher than would be expected. The samples were taken from a residential/midden area north of the main mound. It is hoped that further investigation and/or data from other artifact categories will help explain the relatively large quantities of corn kernels at Pace McDonald.

Three maygrass grains and one chenopodium seed were recovered from Unit 1. These plants are of particular interest to archeologists because they are part of a complex of native starchy seeds that were cultivated in parts of the Eastern Woodlands of North America prior to the advent of corn agriculture. Maygrass and chenopodium grow wild in many parts of the Eastern Woodlands, including modern Anderson County. No changes in seed attributes associated with intensive cultivation have been identified for maygrass. Thin seed testa (< 20 μ) is an indicator of domestication in chenopodium (Smith 1992). Thin seed coats area also associated with truncate margin morphology (Smith 1992:187). The chenopodium

Table 35. Kernel:Cupule Ratios from Selected Caddo Sites in East Texas.

Type	Site	Kernel: Cupule Ratio
Residential	Spoonbill (41WD109)	0.01
Residential	Indian Creek 2 (41SM404)	0.02
Residential (area within Mound Center)	Pine Tree Mound (41HS15)	0.02
Residential	41TT852	0.04
Residential (area within Mound Center)	Boxed Springs (41UR30)*	0.04
Residential	Johnson Farm**	0.05
Residential	41TT853	0.06
Residential	Pine Cone (41RR236)	0.12
Residential	Cobb-Pool (41DL148)***	0.13
Residential	41TT851	0.19
Elite/ceremonial (area within Mound Center Core)	Pine Tree Mound (41HS15)	0.44
Residential (midden within Mound Center)	Pace McDonald (41AN51)	0.86

*poor data quality (n=55) **588 cupules are from a single post ***ratio calculated with weights, not counts

specimen at Pace McDonald appears to be a wild type. The status of the maygrass grains are uncertain. Although these native starchy seeds appear sporadically on Northeast Texas and Northwestern Louisiana sites (Table 36), they are typically neither abundant nor ubiquitous. The seeds are easy to dismiss on any single site as accidental inclusions, but taken together, the pattern is suggestive, especially given the low abundance and ubiquity of small wild seeds on East Texas sites in general.

Woodland Period cultivation of native starchy seeds was centered in the Central Mississippi and Ohio River Valleys, roughly in the areas of the later Mississippian and Fort Ancient cultures (Johannessen 1993:Figure 5-1). Morphological correlates of domestication appear for chenopodium by the Late Archaic (Smith 1992), and the seeds are found in large quantities on Woodland sites in the American Bottom. Starchy seed cultivation was either absent or less important in other areas of the Eastern Woodlands. Native starchy seeds are found in low quantities in Late Woodland samples in west-central Alabama (Scarry 1986), and they also appear at Moundville, "although these indigenous seed crops were not as important in the Moundville area as they were in some other parts of the southeast" (Welch and Scarry 1995:405). In the Lower Mississippi Valley, there is little evidence of native starchy seed use until Marksville times, but even then cultivation is "not on the scale of their trading partners to the north" (Fritz 2000:238). Only in the northern part of the Lower Mississippi Valley does pre-corn cultivation seem to have been important, as at the Taylor Mounds site in southeastern Arkansas (Fritz 2000:238). In contrast to the situation in the Lower Mississippi Valley, the Arkansas River Valley sees intensive cultivation of native seed crops and, by A.D. 700, the use of maize. Evidence comes from the Toltec Mounds site associated with the Plum Bayou culture (Fritz 2000).

Fiber plants

Cane stems were recovered from the 50-60 cm bs level of Unit 1, and stems of a smaller grass were recovered from the 60-70 cm level of the same unit. Native people used cane in many items, including mats, baskets, screens to divide rooms, spear shafts, arrow shafts, pipe stems, blow guns, flutes, and blow

Table 36. Caddo and Late Prehistoric Sites in Northeast Texas and Northwestern Louisiana with Native Starchy Seeds.

Site	Component	Chenopodium (*Chenopodium* spp.)*	Maygrass (*Phalaris caroliniana*)	Litle Barley (*Hordeum pusillum*)	Knotweed (*Polygonum* spp.)**	Source
Stallings Ranch (41LR297)	Woodland/Early Caddo	X	X	X		Bush 2008a
41DT16	Woodland/Early Caddo	X	X			Dering 1993
Ray (41LR135)	Woodland/Early Caddo		X			Fritz 2008
Thomas (41DT80)	Early Caddo	X			X	Crane 1996
Doctor's Creek (41DT124)	Early Caddo	X			X	Crane 1996
Spider Knoll (41DT11)	Early Caddo		X		X	Dering 1994
Hurricane Hill (41HP106)	Early/Middle Caddo				X	Goldborer and Perttula 1999
Cobb-Pool (41DL148)	Late Prehistoric, 13th century A.D.	X	X	X		Fritz 1993
Longlois (16NA657)	Middle Caddo		X		X	Bush 2011a
Oak Hill (41RK214)	Middle Caddo	X	X			Dering 2004
Spoonbill II (41WD109)	Middle Caddo	X				Crane 1982
Pinecone (41RR236)	Middle Caddo		X			Fritz 2008
Pace McDonald (41AN51)	Middle Caddo	X	X			this report
41TT851	Middle/Late Caddo	X	X	?	X	Bush 2011b
Roitsch (41RR16)	Middle/Late Caddo	X	X			Fritz 2008
Pine Tree (41HS15)	Middle/Late Caddo	X	X	X	X	Bush 2009
41HS588	Late Caddo	X				Bush 2008b
41TT852	Late Caddo	X	X	X	X	Bush 2011b
41TT853	Late Caddo		X			Bush 2011b
McLelland (16BO236)	Protohistoric	X				Gardner 1994
Joe Clark (16BO237)	Protohistoric	X	X			Gardner 1994
41RA49	Middle Caddo		X			Dering 2011

*Includes domesticated and wild forms
**May include species other than *P. erectum*.

tubes used in healing (Moerman 1998:104). Henri Joutel mentions use of cane for torches: "They had lit some dry canes to see better because they do not have knowledge of candle-making nor of burning oil (although they make oil with nuts)" (Foster 1998:235). Grass stems were also used in basketry, for brooms, and to thatch houses (Moerman 1998; Swanton 1996:148-149).

Nutshell

Nutshell recovered from the samples consisted overwhelmingly of thick-shelled hickory, but acorn, black walnut, and thin-shelled hickory were also present. The thick-shelled hickory nuts are most likely black hickory (*Carya texana)*, a common hickory of the area that exhibits the combination of pecan-type wood and thick-shelled nuts seen at Pace McDonald.

Hickory nutshell is extremely common on archeological sites in regions where hickory trees are present. Some of this abundance may be attributed to the durability of hickory nutshell and its utility as a fuel, which results in significant exposure to fire. In addition, hickory nuts are high-density foods that can be processed far more efficiently than other types of nuts. Traditional hickory processing methods used by Iroquois, Choctaws, Cherokees, and many other peoples involve pounding hickory nuts into small pieces and then heating them in water, where the oil can be skimmed off, the nutmeat retrieved from suspension, and the shells allowed to sink to the bottom (Fritz et al. 2001; Moerman 1998:140-141). Experiments by archeologists show that this process yields a much larger number of calories per labor invested than does cracking and picking (Talalay et al. 1984:353). Other common nuts cannot be processed in this manner because either their meats float (acorn, hazelnut) or the nuts become bitter (walnut).

It has been suggested that hickory trees were managed by aboriginal populations (Albert 2007, 2011; Delcourt and Delcourt 2004; Munson 1986). Creating open stands of hickory requires only the effort of girdling non-hickory trees in a particular plot. The open stands increase the hickory canopy by a factor of about six (Munson 1986). At least as important is the fact that it decreases the ability of squirrels to jump from tree to tree, thus increasing the opportunities for predation by humans and other squirrel consumers. Patrick Munson estimates that these two results increase nut yield in an open plot (defined as nuts on the ground at optimum collecting time) by 287 times over the yield in a closed forest. He calculates that five days' labor with a stone axe and annual burning thereafter on one hectare will yield 2000 calories for 171 days in open stands (Munson 1986).

Like most nuts, hickory nutmeat is high in fat and contains more protein than most plant foods. These nutrients, particularly the linolenic fatty acids, may have been critical to hunter-gatherers who relied on lean meat for a portion of the year (Gardner 1997; Hall 2000:109-110). Acorn nut, the second most common taxon of nut resource at Pace McDonald, contain less fat and protein and more carbohydrates than Juglandaceae nuts (Table 37). In this respect, they are more comparable to grains than to nuts. Acorns require water processing to leach tannins before they are palatable to humans, but they can then be roasted or ground into flour (Gremillion 2002). Joutel was served a dish of acorn meal cooked in meat broth while staying at a village between the Angelina and Sabine rivers (Foster 1998:234-5).

Other wild food plants

Seeds of sumac (n=2), wild bean (n=1) and grape (n=1) were recovered. Fruits of these plants are edible and are known to have been consumed by Native Americans (Moerman 1998). The grass seed recovered in Unit 2 may reflect either a fiber or food use of this important class of plants.

Table 37. Proximate Analysis of Three Edible Tree Nuts per 100 g Dry Weight (USDA, ARS 2010).

	Hickory	Walnut	Acorn
Fat (g)	64	59	31
Protein (g)	13	24	8
Carbohydrate (g)	18	10	53
Water (g)	2	5	5
Energy (kcal)	657	618	509

SUMMARY

Macrobotanical remains recovered from a midden area at the Pace McDonald site consist of wood charcoal, nutshell, corn, grass stems, and seeds of wild fruits. Wood from local forests was exploited for fuel. Food plant remains indicate a diet consisting of both wild and agricultural products. The relatively large quantities of corn kernels in these samples bears further investigation.

Faunal Remains from the Pace McDonald Site

Timothy K. Perttula and LeeAnna Schniebs

A total of 384 faunal remains were recovered from the excavations of Units 1-3 and a 40 x 40 cm fine-screen column (Unit 1A) along one wall of Unit 1. Densities of faunal remains in the 1 x 1 m units range from 55-90 pieces per m^2, with the highest densities in Unit 1 (Table 38). In the fine-screen column, the density of faunal remains is 1000 pieces per m^2, with many unidentifiable fragments.

Table 38. Distribution of Pace McDonald Site (41AN51) Faunal Remains by Provenience.

Provenience (Unit, cm bs)	Total NISP Taxon	NISP	by Unit and level
Unit 1, 20-30	deer	1	1
Unit 1, 40-50	large mammal	42	42
Unit 1, 50-60	unidentifiable	2	
	deer	2	
	large mammal	23	27
Unit 1, 60-70	large mammal	11	11
Unit 1, 70-80	unidentifiable	2	
	turkey	1	
	large mammal	6	9
Unit 1A, 20-30	unidentifiable	1	1
Unit 1A, 30-40	unidentifiable	1	1
Unit 1A, 40-50	unidentifiable	40	
	turtle	1	
	deer	2	
	large mammal	17	60
Unit 1A, 50-60	unidentifiable	60	
	fish	1	
	turtle	1	
	beaver	3	
	indeterminate mammal	6	
	large mammal	12	83
Unit 1A, 60-70	unidentifiable	14	
	large mammal	2	16
Unit 2, 30-40	large mammal	5	5
Unit 2, 40-50	unidentifiable	30	
	deer	1	
	large mammal	22	53

Table 38. Distribution of Pace McDonald Site (41AN51) Faunal Remains by Provenience, cont.

Provenience (Unit, cm bs)	Total NISP Taxon	NISP	by Unit and level
Unit 2, 50-60	unidentifiable	5	
	large mammal	8	13
Unit 2, 60-70	unidentifiable	1	
	deer	3	
	large mammal	3	7
Unit 3, 40-50	unidentifiable	16	
	deer	3	
	large mammal	13	32
Unit 3, 50-60	unidentifiable	2	
	turtle	1	
	large mammal	8	11
Unit 3, 60-70	deer	1	
	large mammal	11	12
Totals			384

With respect to the depth of the recovered faunal remains, the vast majority of the fauna is from 40-60 cm bs, in the buried midden deposits. Approximately 84% of the faunal remains from the Pace McDonald site are in the deposits between 40-60 cm bs, with 49% from 40-50 cm bs, and 35% from 50-60 cm bs (see Table 38). About 66% of the faunal remains are burned, especially the Vertebrata (96%), large Mammalia (42%), the indeterminate turtle (100%), indeterminate fish (100%), and the turkey bone (100%) (Table 39).

Table 39. Summary of Faunal Recovery from the Pace McDonald Site (41AN51).

Taxon	NISP	MNI	Habitat*	Percent	Burned
Vertebrata (indeterminate)	174	–	–	45.3	168
Indeterminate fish (Osteichthyes)	1	1	A	0.3	1
Indeterminate turtle (Testudinata)	3	1	A	0.8	3
Turkey (*Meleagris gallopavo*)	1	1	WE	0.3	1
Beaver (*Castor canadensis*)	3	1	A	0.8	–
White-tailed deer (*Odocoileus virginianus*)	13	1	WE	3.4	2
Mammal (size indeterminate)	6	–	–	1.6	–
Mammal (large Mammalia)	183	–	–	47.7	77
Total	384	5		100.0	252

*Preferred Habitat (Davis 1978): A=aquatic (rivers, swamps, marshes); WE=wooded edges (open meadows, parkland).

The identifiable faunal species in the Pace McDonald collection are diverse, given the small sample size (see Table 39). This includes wooded edge species such as white-tailed deer and turkey, common animals exploited by Caddo hunters throughout East Texas, as well as species and genera such as fish, turtle, and beaver that prefer aquatic habitats. White-tailed deer was most likely the primary game animal hunted by the Caddo peoples that lived at the Pace McDonald site for meat and protein, hides, and bone tools, as it is at other Caddo sites on Mound Prairie Creek (Amick et al. 1991), as judged by the number of identifiable specimens and well as large mammal faunal remains.

SUMMARY OF THE ARCHEOLOGICAL FINDINGS FROM THE PACE MCDONALD MOUND CENTER

The Pace McDonald site (41AN51) is a prehistoric Caddo mound center in the upper Neches River basin of East Texas that was established and occupied during the Middle Caddo period (ca. A.D. 1200-1450); it also was occupied during the Late Archaic and Woodland periods, but not as part of a sedentary settlement. Its temporal and cultural relationships to other important mound centers in the region (Figure 29) has heretofore been poorly known, however, primarily because of limited archeological investigations and analytical studies that have been conducted at the site over the years. Our work at the site in 2010 and 2011, including surface collections, shovel testing, and the excavation of a few 1 x 1 m units, represents the first step in a likely long-term effort to learn more about the nature of the Caddo occupation at this mound center.

What is known about the prehistoric Caddo occupation of the Pace McDonald site is that the site is on an upland landform overlooking Mound Prairie Creek, a tributary to the Neches River, has evidence of a settlement that covers at least 11 acres, and two earthen mounds were constructed there by the Caddo. Both mounds appear to have been built to cover special purpose structures where significant deposits of ash was accumulated, similar to the main mound at the nearby A. C. Saunders site (see Jackson 1936) (see Figure 29) or the ash temple (albeit, without a covering mound) at the Crenshaw site (Schambach 1996).

Including work down by The University of Texas in 1933 and 1978-1985, and our investigations, there is now a reasonably large sample of ceramic and lithic artifacts from the site. With respect to the prehistoric Middle Caddo component, the material culture remains that can be associated with it include: (1) a significant percentage of plain ware vessel sherds (mainly grog-tempered), primarily incised, punctated, and incised-punctated utility wares, and both engraved (i.e., geometric elements, significant proportion of hatched and cross-hatched elements, mainly triangles, and carinated bowls and bottles) and (many) red-slipped fine wares; (2) an L-shaped elbow pipe, a 14th century ceramic innovation; and (3) Alba and Perdiz arrow points and a few expedient flake tools. Two calibrated radiocarbon dates obtained from buried midden deposits north of Mound No. 1 at Pace McDonald range from A.D. 1200-1410, squarely in the Middle Caddo period (see Appendix 1).

The fine wares from the site are part of a Middle Caddo period East Texas style zone or ceramic tradition in the Angelina and Neches river basins, as well as parts of the middle and upper Sabine River basin, at other better known and studied sites such as Washington Square, Oak Hill, Redwine, and Jamestown (see Figure 29). The engraved fine wares at these sites all have hatched or cross-hatched curvilinear and vertical ladders or narrow panels, as well as hatched and cross-hatched triangles, pendant triangles, or rectangular panels with engraved triangles (see Rogers and Perttula 2004); in some instances, there are engraved vessels with vertical and triangular panels filled with concentric circles (Hart and Perttula 2010).

The apparent popularity of red-slipped pottery at the Pace McDonald site is also consistent with a Caddo occupation during the 13th and 14th centuries A.D., which was when a tradition of manufacturing red-slipped carinated bowls and bottles was established across much of the western part of East Texas. At the Middle Caddo period Jamestown Mound site (41SM54), for example, more than 26% of the decorated

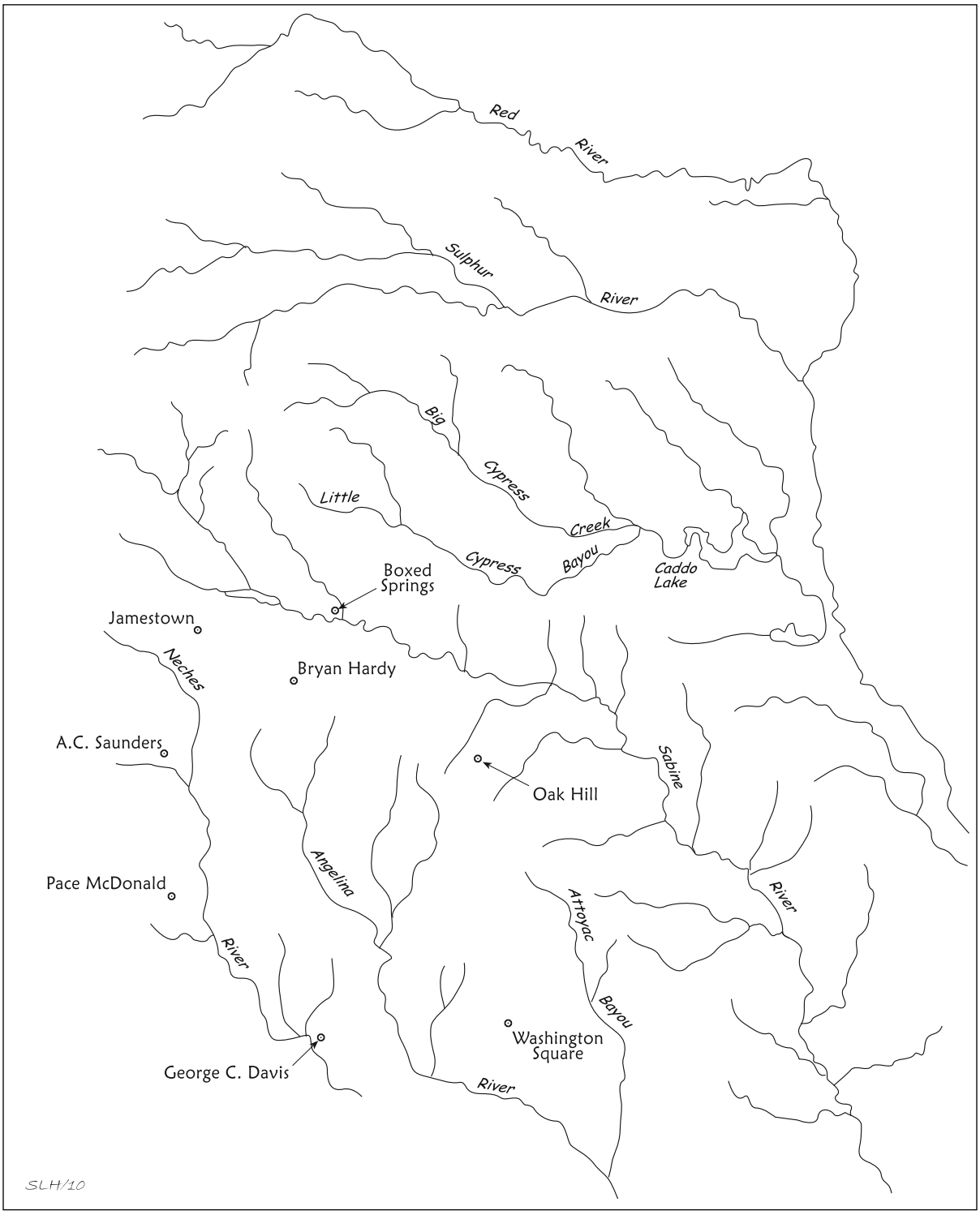


Figure 29. Known Caddo earthen mound sites in the area around the Pace McDonald site.

sherds (n=84) are from red-slipped vessels, including one Maxey Noded Redware bottle sherd (Perttula and Walker 2008:7); there are two Maxey Noded Redware sherds from Pace McDonald.

Story (2000:23) examined the Pace McDonald collection at the Texas Archeological Research Laboratory at The University of Texas at Austin, and her comments are apt, as she "found little evidence for either an Alto phase or Frankston phase connection. The age and affiliation of this, one of the few other mound sites near Davis [George C. Davis], are yet to be established." Thurmond (1978:26), some years before, concluded that the Pace McDonald site was "transitional between the two foci [Alto and Frankston]." Essentially, what both Story (2000) and Thurmond (1978) were suggesting is that the Pace McDonald Caddo occupation dated prior to the onset of the Late Caddo Frankston phase, which occurred around A.D. 1400-1450, and began sometime before the end of the Alto phase.

The Pace McDonald site is currently viewed as a Middle Caddo period mound site whose occupation overlapped with that of the long-occupied George C. Davis mound center (most likely the component there associated with the construction of the Mound B platform around ca. A.D. 1200, see Story 1997:65), but apparently it continued to be used as a mound center after the George C. Davis mound site was abandoned in the early A.D. 1300s. In cultural terms, then, and relying heavily on the character of the decorated ceramic sherds in the large sherd assemblage, the Pace McDonald site was an important mound center built by a prehistoric Caddo group that was apparently related to others of similar socio-political character in the upper Neches, middle and upper Sabine, and the Angelina River basin (see Figure 29). The Pace McDonald site may have been a subsidiary mound center affiliated with the larger George C. Davis site, but it continued to be occupied for at least 50-100 years after the latter site was abandoned in the early 14th century.

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Appendix 1, Beta Analytic Radiocarbon Forms for Pace McDonald Samples

Beta Analytic Inc.
4985 SW 74 Court
Miami, Florida 33155 USA
Tel: 305 667 5167
Fax: 305 663 0964
Beta@radiocarbon.com
www.radiocarbon.com

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September 20, 2011

Dr. Timothy K. Perttula
Archeological & Environmental
Consultants , LLC
10101 Woodhaven Drive
Austin, TX 78753
USA

RE: Radiocarbon Dating Results For Samples AN51-1, AN51-2

Dear Tim:

Enclosed are the radiocarbon dating results for two samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses proceeded normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

Thank you for prepaying the analyses. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood

Digital signature on file

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Dr. Timothy K. Perttula

Report Date: 9/20/2011

Archeological & Environmental Consultants , LLC

Material Received: 9/12/2011

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 305693	790 +/- 30 BP	-24.6 o/oo	800 +/- 30 BP
SAMPLE : AN51-1			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal AD 1200 to 1270 (Cal BP 750 to 680)			
Beta - 305694	370 +/- 30 BP	-10.2 o/oo	610 +/- 30 BP
SAMPLE : AN51-2			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal AD 1290 to 1410 (Cal BP 660 to 540)			

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.6:lab. mult=1)

Laboratory number: **Beta-305693**

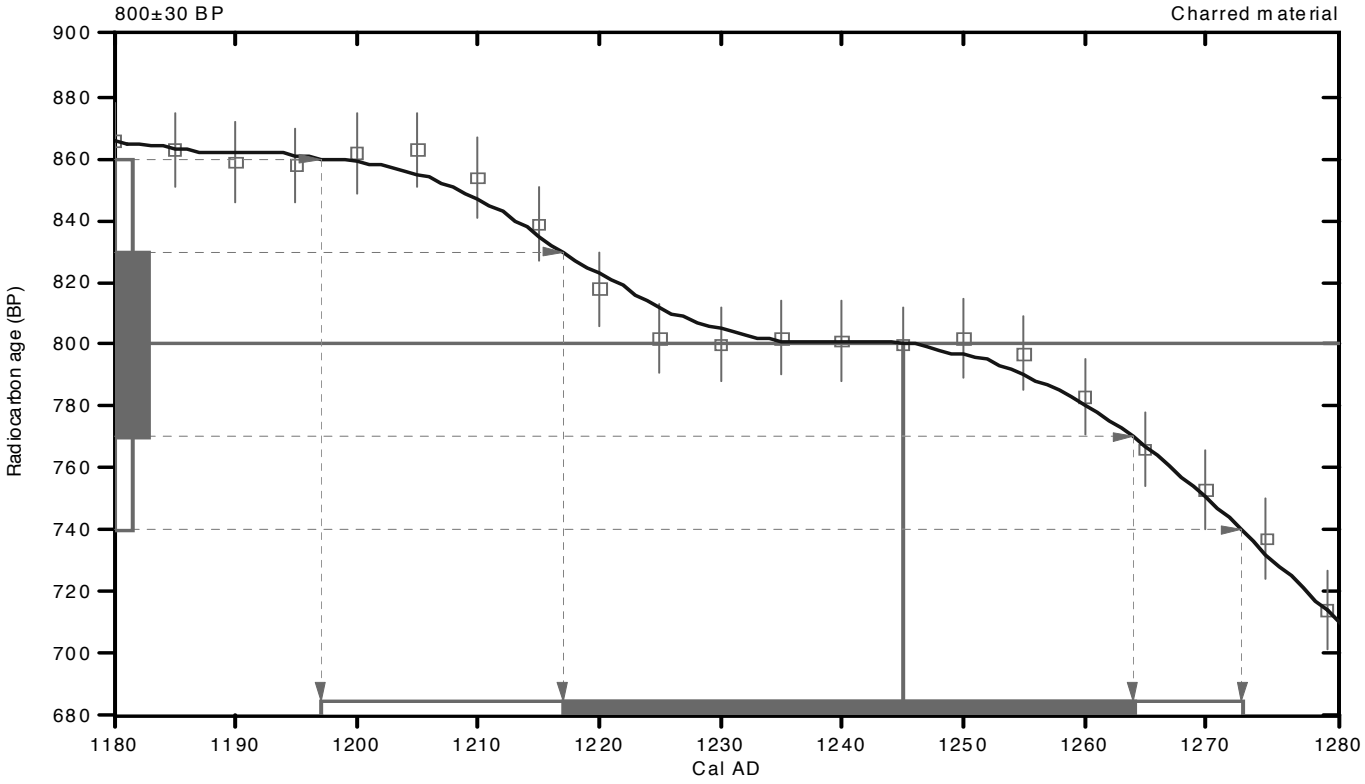
Conventional radiocarbon age: **800±30 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 1200 to 1270 (Cal BP 750 to 680)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1240 (Cal BP 700)

1 Sigma calibrated result: (68% probability) Cal AD 1220 to 1260 (Cal BP 730 to 690)



References:

Database used

INTCAL04

Calibration Database

INTCAL04 Radiocarbon Age Calibration

IntCal04: Calibration Issue of Radiocarbon (Volume 46, nr 3, 2004).

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-10.2:lab. mult=1)

Laboratory number: **Beta-305694**

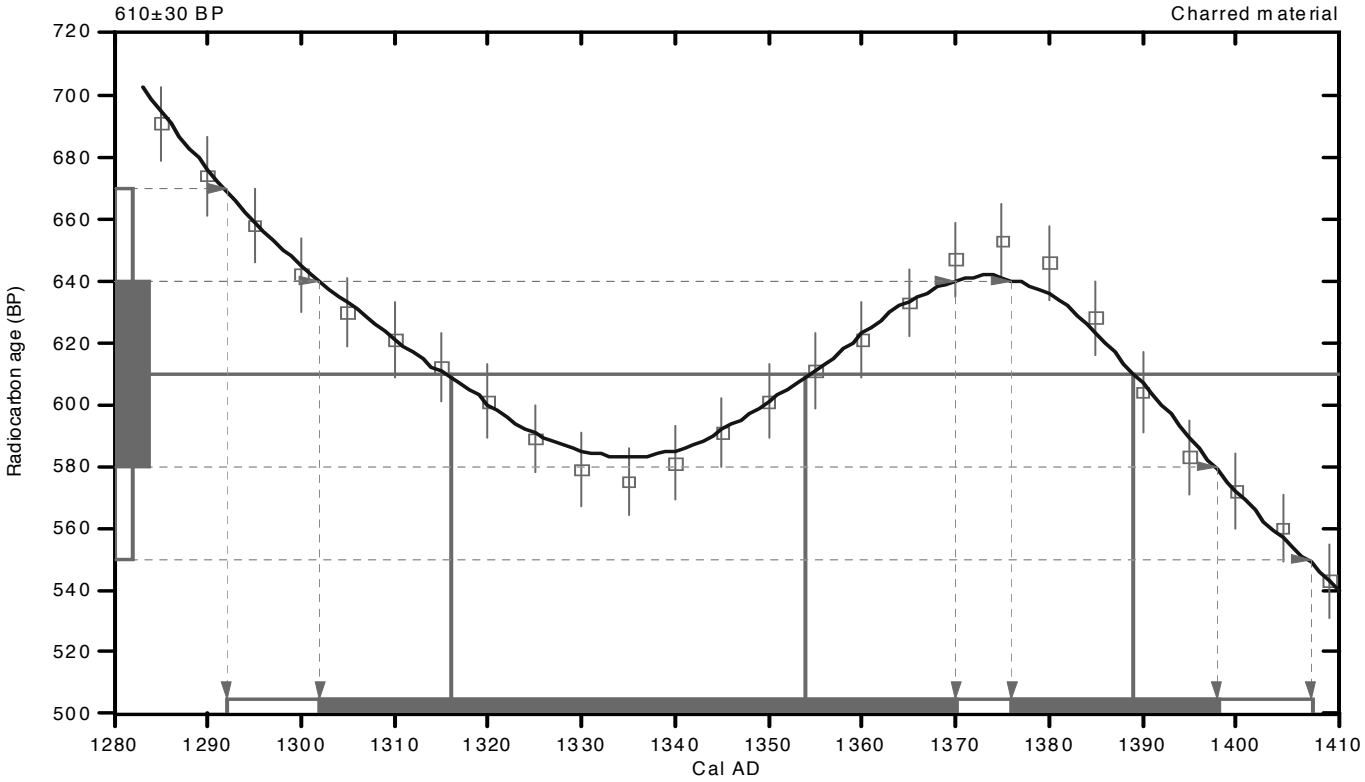
Conventional radiocarbon age: **610±30 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 1290 to 1410 (Cal BP 660 to 540)**

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal AD 1320 (Cal BP 630) and
Cal AD 1350 (Cal BP 600) and
Cal AD 1390 (Cal BP 560)

1 Sigma calibrated results: (68% probability) Cal AD 1300 to 1370 (Cal BP 650 to 580) and
Cal AD 1380 to 1400 (Cal BP 570 to 550)



References:

Database used

INTCAL04

Calibration Database

INTCAL04 Radiocarbon Age Calibration

IntCal04: Calibration Issue of Radiocarbon (Volume 46, nr 3, 2004).

Mathematics

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